Handbook of naval combat underwater demolition team training.

U.S. Bureau of Naval Personnel Training. Standards and Curriculum Division.

HANDBOOK
OF
NAVAL COMBAT UNDERWATER DEMOLITION TEAM TRAINING

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NAVAL COMBAT UNDERWATER DEMOLITION TEAM TRAINING

PREPARED BY

BUREAU OF NAVAL PERSONNEL TRAINING
STANDARDS AND CURRICULUM DIVISION

AND

UNITED STATES ATLANTIC FLEET
AMPHIBIOUS TRAINING COMMAND
U. S. NAVAL AMPHIBIOUS TRAINING BASE
NAVAL COMBAT DEMOLITION UNITS PROJECT
FORT PIERCE, FLORIDA

1944

FOREWORD

This handbook is intended to acquaint the Fleet Amphibious Forces and other branches of the armed services with the qualifications of Underwater Demolition Teams, and the training given to the teams at the Amphibious Training Base, Fort Pierce, Fla. In addition, the handbook serves as a guide to the Naval Combat Demolition Units Project in carrying out its training responsibilities at the Base.

Information is given in the following pages on the mission and tactical use of Underwater Demolition Teams, duties of team members, selection of trainees, organization of the school, methods and facilities for training, description and length of courses, instructional references, and training aids.

F. W. Rockwell,
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United States Atlantic Fleet.

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October 23, 1944.

It is recognized that experience is being continually acquired in the Pacific theatres in the employment of Underwater Demolition Teams. Consequently, details of organization, training, and equipment are susceptible to frequent change. It is believed that the present handbook embodies the latest demolition opinion and practice as of the date of publication. Changes will be distributed to all addressees whenever they are required.

INTRODUCTION

The Naval Combat Demolition Units Project was initiated as a part of the U. S. Atlantic Fleet Amphibious Forces training program on 6 May 1943, as a result of a directive issued by the Commander in Chief, U. S. Fleet. The purpose of setting up the training was to prepare selected personnel in the removal of underwater obstacles. At first, the trainees were drawn entirely from the Construction Battalion. Now, qualified men are accepted from any branch of the Naval Service.

Lieutenant Commander Draper L. Kauffman was the first officer in charge of the project. With his wide range of experience in bomb disposal and demolition work as a background, a vigorous training program was established.

The first graduating unit was ordered to Kiska, Alaska. More recently units have been dispatched for combat duty to both the European and Pacific theatres. A recent Presidential citation of one of the units participating in the Normandy invasion described the role of demolition teams in landing operations. To quote the citation, "In spite of great handicaps, the demolition crews succeeded initially in blasting five gaps through enemy obstacles for the passage of assault forces to the Normandy shore and within two days had sapped over 85 percent of the 'Omaha' beach area of German-placed traps."

Demolition duty is hazardous. It involves direct handling of military explosives and close contact with enemy forces. The risk involved in working with explosives, however, is largely overcome through training in proper handling. The risk in combat is an inherent part of the job, but it is alleviated by the use of proper tactics and by cooperation with support provided by barrage or assault forces.

Only volunteers are accepted by the Naval Combat Demolition Unit for demolition duty and they must be men who are outstanding in physical stamina, courage, and individual resourcefulness.

The training given at Fort Pierce to meet combat requirements includes: handling of explosives, underwater reconnaissance, removal of obstacles, detection of mines and booby traps, seamanship, night vision and observation of coastal silhouettes, use of rubber boats, physical conditioning, long distance surf swimming with equipment, armed and unarmed combat, stealth and concealment, shallow water diving, close order drill, military discipline, and minesweeping in shallow water.

The training is rigorous and concentrated, with major emphasis on physical conditioning and drill in removing obstacles through use of

hand placed charges. Ability and speed in analyzing and solving demolition problems is considered the most important outcome of the work.

The course normally extends for eight weeks. Ten weeks time is available for some groups. The number of trainees dropped during the school term is high. Only those who are fully qualified in their respective duties are permitted to complete the training as members of Underwater Demolition Teams. Upon graduation, these men are prepared to take their places as an essential part of the Amphibious Forces in achieving effective landing operations.

Upon completion of training at Fort Pierce, men are assigned to the Demolition School at Maui for advanced training, following which they are ready for combat duty.

An illustrated report of this training program is given in the following pages. This is preceded by a brief statement of the mission and duties of Demolition Teams.

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ORGANIZATION AND DUTIES OF UNDERWATER DEMOLITION TEAMS

1. Mission.

Underwater Demolition Teams have the responsibility of removing natural and man-made underwater obstacles which are likely to obstruct landing operations. This mission is performed in close cooperation with other units of the amphibious forces.

2. Tactical Employment.

The tactical employment of Demolition Teams in the removal of obstacles will vary with the theater concerned. Basic procedures may be summarized briefly as follows:

a. *Pre-assault underwater reconnaissance.* Teams undertake underwater pre-assault reconnaissance to familiarize themselves with the characteristics of assault beaches and the nature of obstacles to be found. In addition, as an aid to the initial assault waves, the teams mark obstacles as they are discovered.

When close-in Naval gunfire support exists, reconnaissance is undertaken in daylight for several days before "D-Day". Night reconnaissance is resorted to only as a last expedient.

b. *Pre-assault channel marking.* Following reconnaissance, teams may mark suitable channels to assault beaches. Although this is not one of their primary duties, teams are prepared to carry out this mission.

c. *Pre-assault demolition during darkness.* Under favorable conditions, Demolition Teams, proceeding in darkness by stealth and concealment, may approach the assault beach and perform necessary demolition previous to H-Hour.

d. *Pre-assault demolition during daylight.* Under cover of heavy Naval gunfire support, teams may approach the beach in daylight and perform the necessary demolition previous to H-Hour.

NOTE.—The disadvantage of (c) or (d) under tactical employment is that the element of surprise is lost; this might not be considered too important in some areas. However, the element of surprise was extremely important in the Normandy invasion.

e. *Demolition during assault period.* Teams may be combined with the first wave of assault troops, as was the case in Normandy, and destroy the obstacles while other combat troops neutralize small arms and other enemy fire.

f. *Post-assault demolition.* In cases of emergency, Demolition Teams may assist in clearing beaches and harbor areas after an assault is completed and the objective secured.

The training given at the Naval Combat Demolition Units Project provides men with the conditioning and basic skills needed in all types of reconnaissance and demolition work. Upon this foundation, specialized training can readily be given in various theaters of operation, in terms of the types of obstacles and peculiar conditions which are likely to be encountered. This point of view, the providing of trainees with a thorough grounding in fundamentals of demolition, underlies all training activities of the project.

3. Organization of Underwater Demolition Teams.

An Underwater Demolition Team consists of 13 officers and 85 men, divided into a headquarters platoon (5 officers and 25 men) and four operating platoons (2 officers and 15 men each). The headquarters platoon is composed of the Commanding Officer, Executive Officer, Mine Disposal Officer, Communication Officer, Boat Officer, and 25 men consisting of coxswains, engineers, deck hands, etc. This platoon, aside from its command responsibilities, handles all clerical, administrative, medical, supply, repair, maintenance, and like functions for the entire team. In addition, the headquarters platoon provides boat crews and communication personnel for all operating platoons.

Each operating platoon consists of a platoon leader, an assistant platoon leader and 15 men trained in all phases of demolition work, except boat handling and communications. This arrangement permits each operating platoon to be divided into three operating groups of five men each. Consequently, each group is able to operate as an independent unit. It follows that the sole function of an operating platoon will be reconnaissance and demolition work.

The above modifications of the basic organization plan, removes all drone personnel from the teams, and substitutes for such personnel, men qualified in reconnaissance and demolition work. In operations in which drone equipment is to be used, drone personnel will accompany drone equipment on separate transports and will report for duty to the Commanding Officer of the Underwater Demolition Team assigned to the area in which such equipment is to be used.

In accordance with the foregoing, future teams will be composed of the following personnel:

HEADQUARTERS PLATOON

Duties	Rank or rate	Officers	Enlisted
Commanding Officer	Lieut. Comdr	1	
Executive Officer	Lieutenant	1	
Mine Disposal Officer	Lt. or Lt. (jg)	1	
Communication Officer	Ensign	1	
Boat Officer	Ensign	1	
Master-at-Arms	CBM		1
Medical	CPhM or PhM1c		1
Administration	Y1c or Y2c		1
Coxswains	Cox or S1c		4
Engineers	MoMM1c or MoMM2c		4
Radio Operators and Signalmen	SM1c		6
Radio Technicians (qualified in SCR 536 and 610 radios)	RT1c or RT2c		1
Deck Hands	S2c and S1c		4
Cook, Baker, and Steward's Mate			3
Total		5	25

OPERATING PLATOON

Duties	Rank or rate	Officers	Enlisted
Platoon Leader	Lt. (jg)	1	
Asst. Platoon Leader	Ensign	1	
Reconnaissance or Demolition work.	GM1c or 2c EM1c or 2c CM2c or 3c SF2c or 3c S1c		15
Total		2	15
Total for entire team		13	85

4. Duties of Members of Underwater Demolition Teams.

a. *Headquarters Platoon.*

(1) *Commanding Officer.* Commands the Underwater Demolition Team in all its operations.

Directs the team in hydrographic reconnaissance up to the high-water mark, and compiles and interprets results of reconnaissance.

Directs the team in marking obstacles; may direct it to mark channels.

Directs the team in the destruction or removal of man-made or natural landing party obstacles by means of explosives before, during, and after assault.

May direct the team in minesweeping operations, using size five minesweeping gear.

Is responsible for supply, for shipboard training, for morale, for administration, and for effective cooperation with all other activities operating in the area (especially in the matter of pre-assault intelligence).

Must have a thorough understanding of hydrographic and demolition work in all phases.

On board the parent ship, maintains cooperative relations between the team and ship's company.

(2) *Executive Officer.* Assists Commanding Officer in the performance of his duties.

(3) *Mine Disposal Officer.** Responsible for orderly disposal or rendering safe of any mines found in the area of operation.

May conduct minesweeping operations under the direction of the Commanding Officer.

Maintains liaison with other minesweeping activities operating in the area.

Is responsible for supply, maintenance, repair of all ordnance, ammunition, explosives, and demolition tools.

On board the parent ship, has no regular duties with ship's company.

Maintains liaison with other mine disposal personnel and activities in area.

(4) *Boat Officer.* Responsible for supply, maintenance and repair of all rubber and mechanized boats. Responsible for the safe and efficient loading of ammunition boats, etc.

On board parent ship, has no regular duties with ship's company.

(5) *Communication Officer.* Responsible for supply and maintenance of all radio equipment. Responsible for radio and visual communications, including ship-to-shore.

Responsible for procurement, custody, and distribution of all confidential and secret publications and for reports concerning confidential and secret publications.

(6) *Chief Master-At-Arms.* In charge of routine administration for enlisted personnel: assigns men to work parties, supervises the upkeep of quarters, arranges for musters, handles disciplinary cases in accordance with the Commanding Officer's instructions, etc.

May engage in reconnaissance and demolition work.

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*NOTE.—Should get refresher instruction from MEIU's in area when practicable.

(7) *Pharmacist's Mate.* Treats illnesses, wounds, etc., of team personnel. Instructs team personnel in first aid.

May be called on to set up and operate a sick bay on the parent ship.

(8) *Yeoman.* Performs clerical duties: typing, filing, maintaining records, preparing reports, etc.

In an emergency, may be called on to engage in reconnaissance and demolition work.

(9) *Baker.* Prepares ingredients for, and bakes such products as pastries, bread, cakes and pies; operates oven and other bakery equipment.

In an emergency, may be called on to engage in reconnaissance and demolition work.

(10) *Cook.* Prepares and serves food in accordance with Navy specifications. Stores provisions. Maintains lockers, cooking equipment, and galley in sanitary condition. May plan or assist in planning menus.

In an emergency, may be called on to engage in reconnaissance and demolition work.

(11) *Radio Technician.* Maintains and repairs SCR 536 and 610 radios and any other radio equipment that the team may use. Is responsible for radio parts and tools.

May engage in reconnaissance.

(12) *Duties of Boat Crew Men.* Radio Operator and Signalman, Engineer, Coxswain and Gunner. These four men, qualified in handling motorized boats, form a boat crew; one such boat crew is attached to each operating platoon.

Must be able to perform all the boat-crew duties in order to replace casualties. Must be expert in handling the motorized boat in tricky currents and reef surf.

Must be able to maintain and fire small arms, including light automatic weapons.

May be called on to do reconnaissance and demolition work.

Must be familiar with natural and man-made landing party obstacles, and must be able to destroy or remove them with explosives.

Specific duties are as follows—(a) *Radio Operator and Signalman.* Maintains communication with parent ship, rubber boats, etc., by means of SCR 536 and 610 radios or visual signals.

Must be able to maintain SCR 536 and 610 radios. (*Note:* Two radio operators and signalmen, in addiiton to the SM1c, stay aboard parent ship; four go with boats).

(b) *Engineer.* Maintains, operates, and repairs motors, pumps, and other mechanized equipment in motorized boat.

(c) *Coxswain.* In charge of boat.

(d) *Gunner.* Serves as deck hand, lineman, grapnel man, and gunner.

b. Operating Platoon—Officers.

1. *Platoon Leader:* Direct one of four operating platoons in pre-assault reconnaissance (day or night).

Makes up chart from reports of the individual swimmers.

Directs platoon in marking obstacles by means of buoys, etc.; may direct platoon in marking channels.

Directs platoon in destroying or removing natural or man-made landing party obstacles by the use of explosives, before, during, and after assault.

Must be expert in recognizing all types of obstacles, both land and underwater, and in determining the proper type of explosive to use, the right amount of explosive, and the correct method of placing, priming, and firing charges.

In direct command of the platoon motorized boat; responsible for bringing the craft safely into correct operating position and keeping it there until work is done.

May assume direct command of one of the platoon's three LCRs.

Must be expert in judging depth of water and strength of current, wind and surf. May direct platoon in minesweeping operations.

On board the parent ship, briefs platoon and maintains morale; has no regular duties with ship's company.

(2) *Assistant Platoon Leader:* Assists platoon leader in carrying out his duties.

c. *Operating platoon—Enlisted Men.*

Each operating platoon consists of 15 men. The following rates are desirable:

1 GM1c	1 CM1c	3 S1c	2 EM2c	1 SF2c
2 EM1c	1 SF1c	1 GM2c	1 CM2c,	2 S2c

All members of the operating platoon are given the same training; their combat duties are completely interchangable. The use of particular men for specific combat duties is determined by the platoon officers in terms of the immediate operation. All of these men must be expert in maintaining, repairing, and handling rubber boats, and in using grapnels to secure rubber or motorized boats in tricky currents or reef surf.

They should be able to maintain and fire small arms, including light automatic weapons. They will conduct hydrographic reconnaissance up to the high-water mark (incidentally observing enemy beach defenses, etc., if feasible) partly from boats, but primarily by swimming

and shallow water diving. They will mark obstacles by means of appropriate buoys, etc., and they may mark channels.

They will prepare explosives and stow them in the ammunition boat. They may assist in determining the types of explosive needed to eliminate various obstacles, the amount of explosive, and the proper method of placing, priming, and firing the charges. Two or more men will remain in the ammunition boat to pass charges, line, primacord, weights, tools, etc., to the swimmers. One man will remain to handle the firing line (if firing is done electrically), other men will swim from the boat to the obstacle area, carrying the charges with them; the swimmers will place the charges correctly and tie in the charges with primacord (they will find it necessary to dive in most instances to perform this duty). Each man of the operating platoon must be able to analyze demolition problems, and must be capable of independent decisions and action. The platoon may conduct minesweeping operations with size five minesweeping gear. On board the parent ship, the team will have no regular duties with ship's company.

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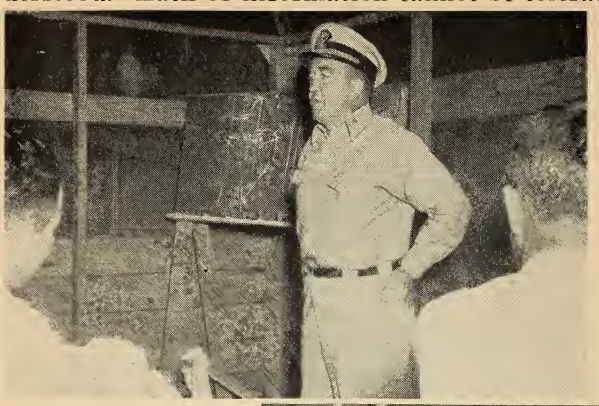
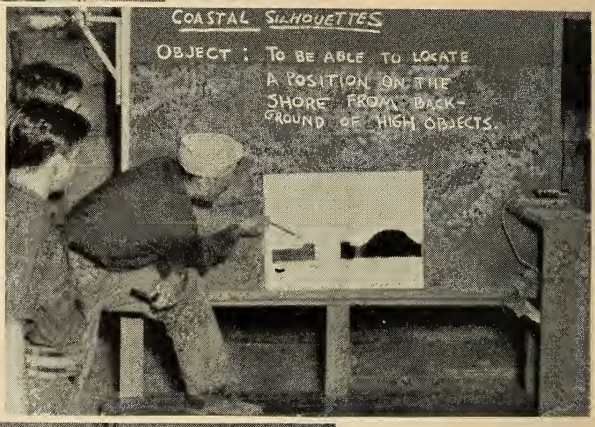
THE TRAINING PROGRAM IN PICTURES

1. Learning the Facts.

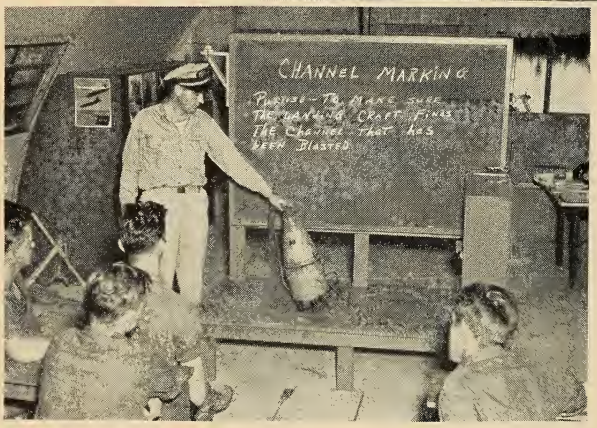
Classroom training provides essential information needed in performing practical work and demolition problems in the field. It is considered important by the staff that every point be thoroughly understood. Lack of information cannot be tolerated.



C. O. briefing members of staff at daily conference at 0700 preceding muster in morning.



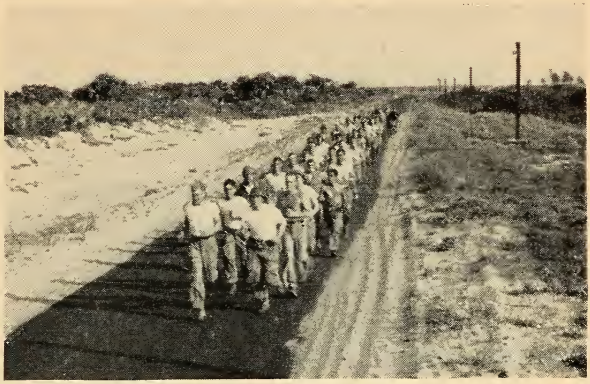
Instruction in recognition of coastal silhouettes.



Learning techniques of channel marking.

2. Toughened Bodies.

All trainees are given thorough physical conditioning through swimming, obstacle course work, and other vigorous physical activities. Demolition operations require that every man be in the very best of condition for performance of duty.



Morning three-mile speed march.

End of obstacle course—coming down ladder without using hands, to develop balance and sure-footedness.

Checking the men on the two-mile swim as they start to encircle the LCVP.

3. LCR Training.

The rubber boat is indispensable to the demolition team wherever the element of surprise or concealment is advisable. LCR training not only develops skill in handling but also is a valuable means of physical conditioning. Two aspects of the training shown here are learning to dump the LCR and learning to place it aboard the LCVP.

Dumping the LCR. First step—Coxswain or officer takes all paddles and falls over backward into water.

Second step — two men standing on one side of rubber boat pull bridle fastened to opposite side, which flips boat upside down. Two men whose hands are visible at top of boat are pulled into bottom of craft as it comes to rest and bridle is then handed to them.

Third step—men on bottom with bridle, right boat to original position, reversing procedure of step two.

4. Placing LCR Aboard LCVP.

Painter secured and paddles handed aboard.

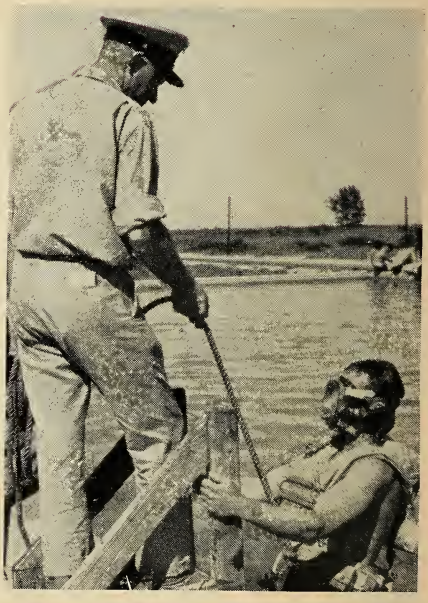
Dumping water—bridle hooked to outboard side of boat.

Boat brought aboard upside down.

5. Shallow Water Diving.

Practice in shallow water diving prepares men for underwater reconnaissance work and for placing charges on obstacles in the surf.

Adjusting air in self-contained shallow water diving outfit.



Showing correct position of tender in relation to diver as latter enters water. Life line is taut at all times.

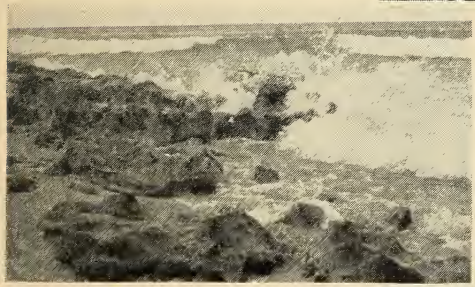
6. Underwater Reconnaissance.

Pre-assault reconnaissance familiarizes demolition teams with characteristics of assault beaches and with the nature of existant obstacles. One such obstacle, the coral reef, is given special attention in practical work and field problems at Fort Pierce.

Use of rubber boats in reconnaissance. The rubber boat is indispensable in demolition reconnaissance work. Trainees at N. C. D. U. P. learn to handle LCR's in rough water, tricky currents, and reef surf.

Launching rubber boat from LCVP is done stern first.

Taking soundings from rubber boat.



Coral outcroppings—ridge of coral extends seaward forming reef a few feet under water. This ridge is extensively used in reconnaissance training at Fort Pierce.

Leaving beach after completing reconnaissance—launching LCR in surf.

7. Stealth and Concealment.

In learning the approach to enemy held beaches, various methods of stealth and concealment are taught. Included are specific techniques of approach through the surf, on the sand, and inland, including correct methods of crawl.

Approaching Obstacles from a Rubber Boat.

Low silhouette of men approaching objects in surf in LCR.

Crew approaching in surf with one man remaining behind to take care of the boat.

Emerging from surf.

Running primacord trunk line and placing Mark 20 charge in surf.

8. Stealth on the Beach.

Crawling Techniques Demonstrated.

Snake crawl—this is used when speed is required; body is kept low for concealment. Employed mostly in low grass or behind low sand dunes.

Baby crawl—in this procedure elbows are used to pull body forward, aided by a slight push with feet and knees.

Creep—this is the slowest method of all and gives the lowest silhouette. Individual pulls with the flat of his hands and pushes with the tips of his toes.

Drag Crawl—this method is used to carry a heavy load maintaining a low silouette.

9. Explosives.

Demolition training includes careful and repeated practice in: selection of the right explosives, estimating the proper charge, and applying the charge correctly to the obstacle. Accuracy in placing the charge is given primary emphasis. Speed is developed through repeated dry runs by teams working as units on obstacles.

Rubber Hose as a Channel Charge. Securing six lengths of explosive hose together in preparation for channelling charge.

Carrying explosive hose to sand bar in area where channel is to be cleared.

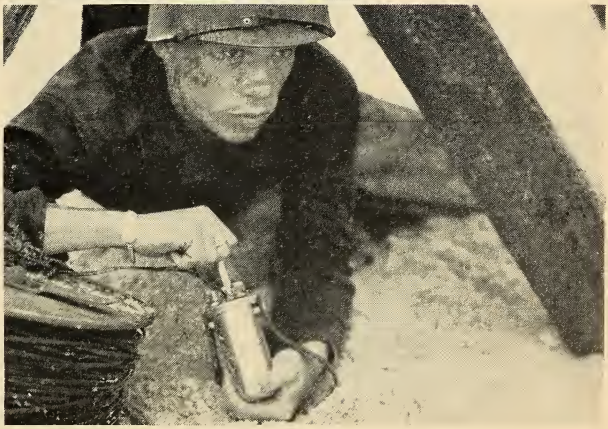
Use of Shaped Charge. The shaped charge is used to cut a hole in the reinforced concrete wall.

10. Preparation for Firing a Charge.

Through repeated instruction and practice, trainees learn correct methods of firing a charge.

Learning correct girth hitch connections of primacord leads to trunk line.

Showing correct methods of making connections.



Demonstrating use of ten cap blasting machine, which is hooked to firing cable and ready to set off charge through a turn of the handle.

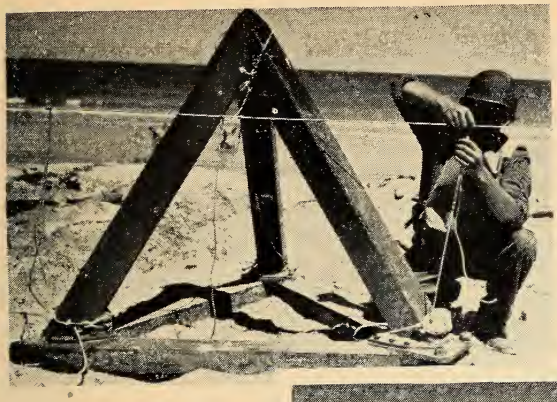
11. Mark Twenty Demolition Charge.

The Mark 20 charge provides a rapid, convenient, and efficient means for destroying enemy obstacles with hand-placed charges. Intensive training in use of this charge is given at the Naval Combat Demolition Unit Project.

Lt. Hagensen, staff officer, demonstrates correct method of removing Hagensen or Mark 20 charge from special carrying bag.

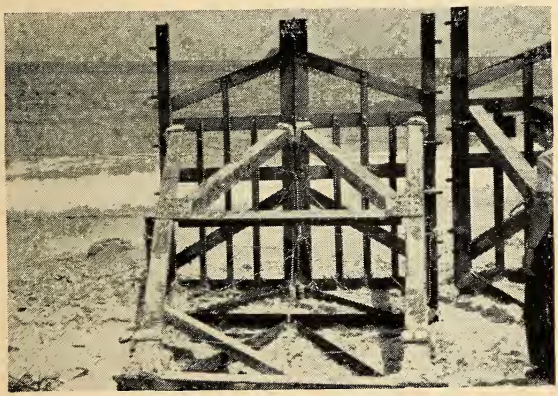
Lecture and demonstration of correct placement of the Mark 20 charge on steel obstacles.

Mark Twenty Demolition Charge—Continued.

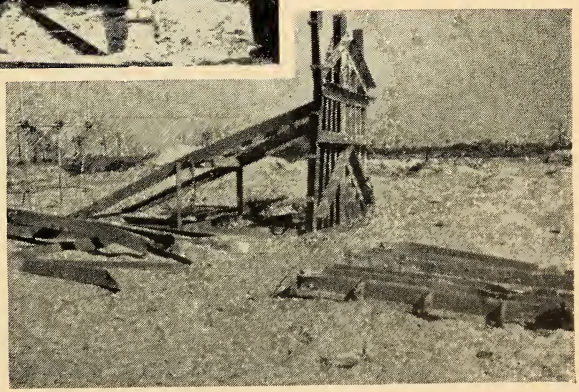


This picture shows charge placed on tetrahedron, and lead line connection.

Result of blast of three charges on tetrahedron, showing minimum displacement of severed members.



Fourteen packs of Mark 20 placed on element C.



Effect of above charges—obstacles levelled.

12. Bangalore Torpedoes.

In addition to their normal use on a barbed wire entanglement, bangalore torpedoes are employed to clear jungle paths.

Stealth and concealment used in bringing bangalores to objective.

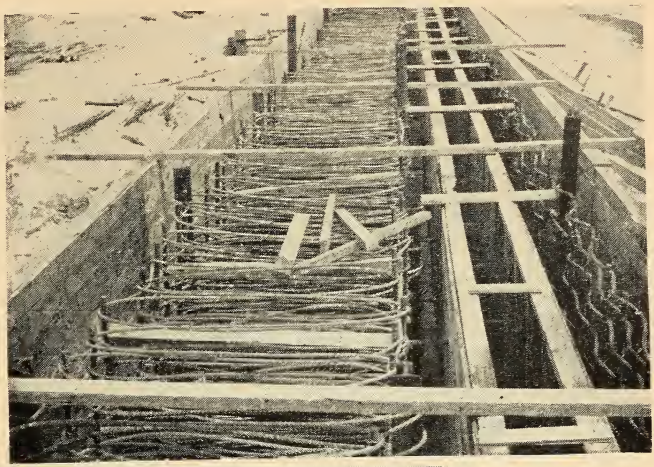
Correct method of elbow creep and carry.

Joining lengths of bangalores and starting placement.

Final placement of connected bangalores in area to be cleared.

13. Construction and Demolition of Obstacles.

Sea Bees build obstacles for demolition teams to destroy.



Construction features of steel reinforced concrete wall.

Pouring concrete into horned sculley forms.

Completed obstacle.

Construction and Demolition of Obstacles—Continued.

Army engineer castle placement of charge against reinforced concrete wall.

Wall blast.

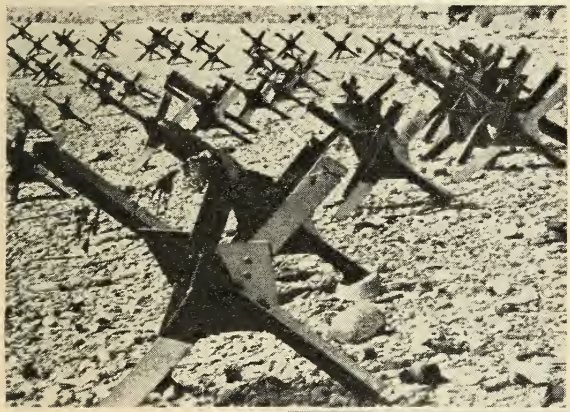
Results of blast.

14. Training Obstacles Duplicate Those Used by the Enemy.

Obstacles used in training at Fort Pierce are the same in construction and form as those encountered in both the European and Pacific theatres. In some cases they are stronger than any known obstacles which have been employed by the enemy.

A. Obstacles Used by the Enemy in the European Theatre.

Concrete ramp or knife rest with Tellermine on point.



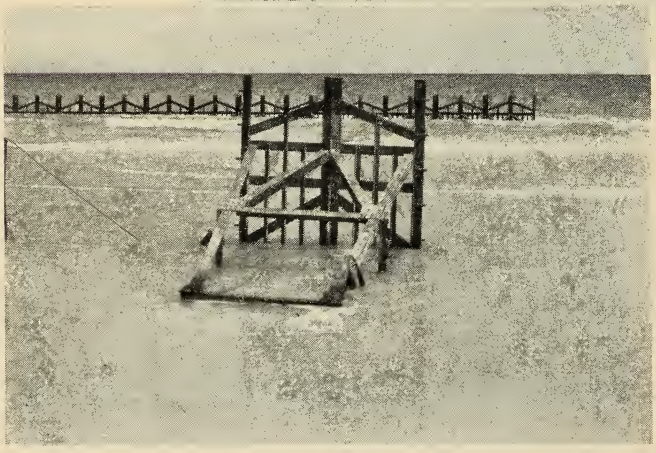
Hedgehogs.

Element C and jetted concrete pilings with Tellermines (arrows) placed on top of both.

B. Similar Obstacles Used in Training at Fort Pierce.

Dry run beach showing jetted rails, jetted pilings, tetrahedrons, and log ramps.

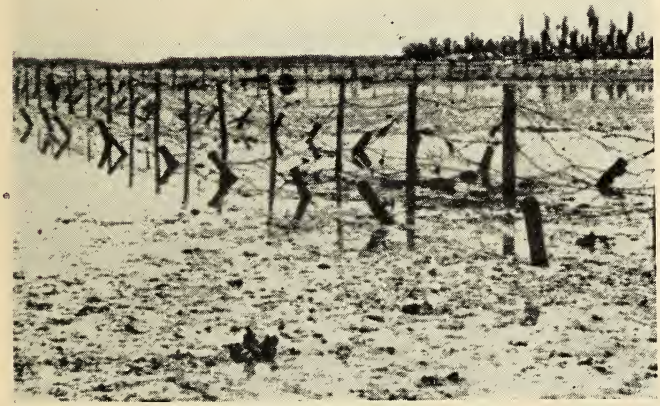
Hedgehogs on dry run beach.



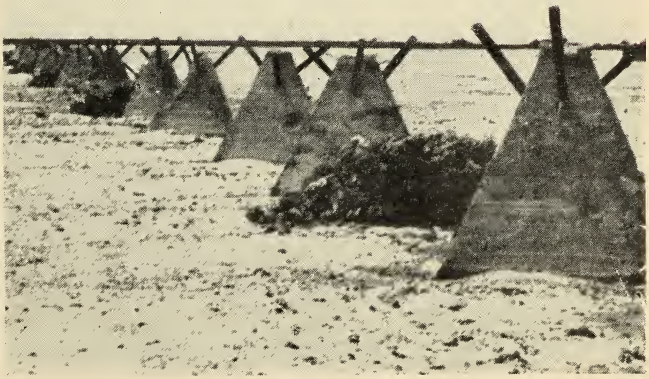
Element C on prac-run beach.

C. Obstacles Used by the Enemy in the Pacific Theatre.

Demolished Japanese - constructed reinforced concrete wall.



Jetted rails (vertical and angle to seaward) and barbed wire.



Japanese horned sculleys.

D. Similar Obstacles Used in Training at Fort Pierce.

Nine foot steel reinforced concrete wall by Sea Bees for Demolition Training practice.

Jetted rails on practice beach.

Horned sculleys in water.

15. Booby Traps.

Demolition teams learn to spot booby traps and to render them harmless. This work is part of the job of clearing paths for assault troops on enemy beaches.

Rendering Tellermine harmless by demolition—placing Mark 20 charge around mine.

Another method of rendering the Tellermine harmless—removing detonator.

16. Gunnery Training.

Demolition teams are trained in gunnery to be prepared to participate in strafing runs, defensive assaults and in actions against low-flying planes.

Firing 50 caliber machine gun.

Instruction in operation of the 50 caliber machine gun.

PURPOSE AND ORGANIZATION OF THE N. C. D. U. PROJECT

1. Training Mission.

The training mission of N. C. D. U. is to prepare carefully selected officers and men to fulfill the duties of Underwater Demolition Teams (previously described).

In carrying out this mission the school has two primary training aims.

First, to develop in trainees a thorough understanding of the nature of amphibious operations, the role of Underwater Demolition Teams in these operations, and the ability to cooperate effectively with other Navy and Army units in carrying out landing operations.

Second, to develop a high degree of skill and speed in the use of hand-placed charges to remove underwater obstacles, both before and during assault operations.

To achieve these two primary aims, N. C. D. U. seeks to qualify all trainees in the following skills and abilities.

a. *Ability to recognize all known types of obstacles to landing party movements, together with a knowledge of their construction and effect on landing operations.*

(1) Natural obstacles, especially coral formations, (reefs, shelves, nigger heads, etc.)

(2) Man-made obstacles, including:

(a) Non-explosive (sculleys, sea walls, coffins, scaffolding, tetrahedra, etc.)

(b) Explosives (mines: acoustic, contact, and magnetic; booby traps; etc.)

b. *Ability to conduct hydrographic reconnaissance (predemolition and post-demolition) up to the high-water mark and beyond if so commanded.*

(1) Ability to handle small landing craft [1] and rubber boats in tricky currents, reef surf, etc.; including piloting at night.

(2) Ability to swim at least two miles through rough water.

(3) Ability to surface dive to at least 15 feet and to conduct underwater observation.

(4) Ability to draw accurate charts showing what obstacles should be removed or destroyed.

c. *Ability to conduct effective demolition or removal of all obstacles, both land and underwater.*

(1) Understanding of, and ability to use selected U. S. Military explosives.

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[1] Headquarters Platoon primarily.

(2) Ability to handle at least 25 pounds weight in water, while remaining afloat.

(3) Ability to handle and load charges underwater to a depth of at least 15 feet.

(4) Ability to select the right explosive for each obstacle, to determine the proper charge, and to apply the charge most effectively.

(5) Ability to make secure and effective lead-line connections.

(6) Ability to identify and to demolish or render harmless all kinds of booby traps, etc.

(7) Ability to conduct shallow-water minesweeping operations.

d. *In addition, the trainees are drilled in:*

(1) Military discipline.

(2) Physical conditioning.

(3) Recognition of shore-line silhouettes.

(4) Use of assault intelligence data.

(5) Communications, especially with TBY–2 equipment.

(6) Hand-to-hand combat and scouting.

(7) Use of rocket launcher (headquarters platoon only).

(8) Gunnery—30 cal., 50 cal., and 20 mm. (headquarters platoon only).

2. Qualifications of Trainees.

Selection for training is based on the following qualifications for trainees:

a. *Volunteers only will be accepted. In addition, the men must have exceptional courage and temperamental stability.*

b. *Age:* Must be between 20 and 35.

c. *Eyesight:* Officers should have at least 15–20 uncorrected vision, corrected to 20–20. All men should have at least 18–20 uncorrected vision (except PhM). All officers and men should have made a satisfactory performance on the night vision test.

d. *Physical Condition and Background:* Must have passed the Amphibious Forces sea duty physical examination. Must be able to endure severe physical hardships. Candidates who have taken part in personal contact type athletics, such as football, are preferred.

e. *Swimming:* All officers and all men (except PhM) must be able to swim at least 400 yards before beginning the course.

f. *Previous Experience:* Sea experience, preferably combat, is a desirable background. Experience in engineering, construction, or other vigorous outdoor work is also desirable.

3. Organization of the Naval Combat Demolition Units Project.

a. *The Officer-in-Charge* is responsible to the C. O., Amphibious Training Base, Fort Pierce, Florida, for the proper selection and train-

ing of Underwater Demolition Teams; and, through the Base Executive Officer, for administration of the N. C. D. U. Camp.

b. *The primary mission* of the Administrative Department under the camp Executive Officer is to make it possible for the other departments to accomplish their missions with the greatest possible success and to carry out the administrative organization of the base. This department is responsible for the camp and the ship's company.

c. *The Training Department*, under the Chief Instructor and the Operations Officer, is responsible for carrying out the basic Training Mission. This department makes daily reports to the Officer-in-Charge on the day's work and on ways to improve the training program.

d. *A close liaison* is maintained with the Intelligence Department of the Joint Army-Navy Experimental and Testing Board and with the Bureau of Ordnance and other government agencies cognizant with ordnance problems.

e. *All methods and equipment* developed by the Bureau of Ordnance Demolition Research Units are made immediately available to Naval Combat Demolition Unit Project.

4. Methods of Training.

Methods of training at Naval Combat Demolition Unit have been divided into four types. These are: (a) lecture, (b) demonstration, (c) practical work, and (d) problems. Most subjects are taught by all four methods. Generally, lectures and demonstrations come first, followed by intensive practical work and problems.

a. *Lectures* provide the basic informational material needed in practical work and problems. Trainees are usually required to take notes. The lectures, particularly those on explosives and estimating charges, are usually accompanied by quizzes.

b. *Demonstrations* to clarify lectures are given by the lecturer, the division instructor, or most frequently, by the division instructor's crew.

c. *Practical work* is designed to drill the trainees so thoroughly that they will instinctively do the right thing even under extreme stress of battle. The practice is usually held during daylight.

d. *Problems* are designed to make the trainee use his own judgment, apply the information he has been given, and work out a course of action for himself. Problem work is usually done at night and represents the culmination of lectures, demonstrations, and practical work on a given subject.

A file is kept on each course containing the written lectures and plans for the subject, all instructors' reports, and suggestions from trainees on how to improve the subject. This procedure is designed

to make certain that each class profits by the training and experience of preceding classes.

Extensive use is made of inter-team competition in swimming, in hand-placing of charges, and in the pay-off course. It is desired to forge each team into a mutually loyal, cohesive, and highly efficient organization. Each crew has a semi-official name. Examples: Kan's Killers, Heideman's Hurricanes, Jeter's Mosquitoes, etc.

Throughout the training the men are expected to respond to all orders immediately. All orders given must be obeyed on the double. Proper relationship and discipline between officers, petty officers, and men are emphasized. Every effort is made to inculcate into the officers the idea of loyalty to their men; and, into the men, the idea of discipline, respect, and loyalty to their officers.

Frequent conferences between the Officer-in-Charge, and small groups of trainee officers are held for two specific purposes. One—the coaching of new officers in their responsibilities as Naval Officers; and two—the obtaining of ideas from trainees as to how the training program can be improved for future classes.

5. Special Facilities for Training.

The following important facilities for training are available at the Base or nearby:

a. *A standard obstacle course.* This course is designed for the day-by-day physical training work of each class. It can be completely rebuilt between classes. It is constructed according to plans laid down by the Officer-in-Charge and the Chief Instructor.

b. *The "Pay-Off" obstacle course* is a mile and one-half in length. It consists of three (3) courses—A, B, and C—each five hundred (500) feet long and with about half a mile safety distance between them. Each course is unique in design and contains obstacles which the Construction Unit believes will stop a Demolition Team. Prior to use the courses are kept secret from the trainees.

c. *Six (6) miles of beach* with heavy surf in winter, fair surf in summer.

d. *Two (2) rock jetties* (for rock landings).

e. *Adequate supplies* of explosives, etc.

f. *A rifle range* at the Base.

g. *An area for firing* at sea, three miles off shore.

h. *The use of landing craft* attached to the Base.

i. *Diving equipment* and a diving pool for preliminary training in shallow water diving.

j. *Rubber boats*, LCVP's, LCM's, rocket boats, and the "Woofus".

k. *TBY-2* portable radios.

CURRICULUM FOR OPERATING PLATOONS

Weekly Schedule—Eight Weeks' Course

A AND B TEAMS

1st week—Indoctrination week.
2d week—Demolition and Explosives.
3d week—Demolition and Explosives Estimating Charges Lecture.
4th week—Basic Reconnaissance.
5th week—Practical Reconnaissance.
6th week—Standard Course and Time Trials on Obstacles.
7th week—Pay-off Assault Problem.
8th week—Jen-Stu-Fu-Reconnaissance. Coral Blasting Problem.

C AND D TEAMS

1st week—Indoctrination week.
2d week—Basic Reconnaissance.
3d week—Practical Reconnaissance.
4th week—Demolition and Explosives.
5th week—Demolition and Explosives. Estimating Charges Lecture.
6th week—Jen-Stu-Fu-Reconnaissance and Coral Blasting Problem.
7th week—Standard Course and Time Trials on Obstacles.
8th week—Pay-off Assault Problem.

NOTE.—All officers of headquarters platoon are expected to take the course as outlined for operating platoons.

SUBJECTS OF INSTRUCTION FOR OPERATING PLATOONS

Subjects	*Hours*
Physical Training and Swimming	96
LCR Training	25
Stealth and Concealment	16
Hikes	6
Diving	18
Voice Procedure (Radio)	1
Extended Order Drill	14
Known Obstacles	4
Capping, Priming, Primacord and Detonator Assemblies	12
TNT ½#—50#—110# Blocks and Charges	7
Bangalores	7
Explosive Hose, Mk. 7 and Mk. 8	7
Tetrytol Packs	7
Composition C—C2—C3	7
Mk. 20 (Hagensen Pack)	14
Estimating Charges	12
Booby Traps	7
Introductory Movies and Lectures on Seamanship	6
Seamanship	7
Compass and Navigation	7
Chart Reading	4
Photo Interpretation	3
Channel Marking	8
Night Vision and Coastal Silhouettes	4
Tides and Currents	3½
Hydrographic and Geographic Reconnaissance on Coral Reefs and Preparing of Charts and Plans	72
Standard Assault Problems and Review of Explosives	60
Jen-Stu-Fu-Coral Blasting and Channeling Problem	72
Pay-Off Assault Problems	68
Apex Units—Familiarization (officers only)	5

DESCRIPTION OF COURSE FOR OPERATING PLATOONS [2]

1. Orientation (first three days).

a. *Physical examinations* are given to all new trainees in order to determine if they meet the qualifications of the amphibious forces.

b. *Personal gear* needed in training is issued to to all hands.

c. *A strength test* is given to all trainees. This is repeated again at the close of the training period.

d. *A four hundred yard swimming test is given.* The ability of trainees to handle themselves in the surf is noted. The men are then classified with a view to preparing them to meet the two mile swimming requirement of the Pacific Advanced Base at Maui.

e. *The over-all picture* of amphibious operations is presented in one introductory lecture.

f. *The history and mission* of the school and its morale and security problems are treated in another introductory lecture.

2. Indoctrination Week.

The primary purpose of Indoctrination Week is to eliminate men who are not capable of standing hazardous and strenuous training. The work during this week also gives trainee officers an opportunity to see how the men in their teams will react when fatigued.

a. *Rubber Boats.* Rubber boat training, which is given during Indoctrination Week, includes a lecture, demonstration and practical work in: Jetty landings, night portages, LCVP landings, and surf handling. While primarily designed to acquaint the men with rubber boats, this instruction also helps condition them physically.

b. *Stealth and Concealment.* In this subject men are taught the fundamentals of scouting and patrolling. A lecture and demonstration are given on the various crawls and methods to be used on approaching enemy beaches or guards. All hands practice these methods until thorough mastery is attained. Both a daylight and night problem are given to test individual abilities and to indicate to trainees that it is a relatively simple matter to infiltrate into enemy areas.

c. *Forced March.* A 25-mile forced march is given during Indoctrination Week to test the physical endurance of trainees. This march is held at night.

d. *Shallow Water Diving.* Shallow water diving is taught to all hands in a pool of 8½ foot depth. A lecture and a demonstration are given on the nomenclature of the gear of the Jack Browne, Victor

[2] Also for officers of Headquarters Platoons.

Berg, and Navy converted gas masks and in addition, the self-contained diving apparatus manufactured by the Ohio Chemical and Manufacturing Company. All hands are given an opportunity to use the different gear and to get acquainted with their various practical uses in the pool. Problems that involve knot tying and pipe work are used so that trainees may develop speed and ease in working with gear under water.

e. *Voice Procedure and Use of SCR–610 Radio.* While the men are waiting their turns at diving practice, they are given a practical lecture on voice procedure and use of the SCR–610 radio. This is not a complete course but will be of value if there is need to use an underwater telephone or to talk over a radio.

f. *Extended Order Problem.* An extended order problem beginning at 0400 in the morning includes beach landings from an LCVP and approach to an enemy bivouac area. The men are briefed regarding security on the march and the difficulty of finding booby traps in a dense tropical swamp.

Trainees are harassed throughout the problem with heavy explosives. This harassing simulates heavy enemy gunfire. If trainees shy at this harassing, it indicates a fear of explosives. On the other hand, officers and men who do well on this problem generally succeed in their other work during the training.

3. Physical Training.

Each day's program throughout the training period begins with 30 minutes of calisthenics or limbering up exercises. The class is then divided into three squadrons for the next 30 minutes. One squadron takes combat swimming, another log physical training, and the other the obstacle course. The next hour is used for long-distance swimming. The school aims to make each man capable of swimming two miles in rough water. During the swimming period, special instructions are given to men who are poor swimmers.

NOTE.—As soon as swim fins and face masks are available at the school, the men will be taught how to use them.

4. Known Obstacles.

a. *Types.* Known obstacles which the enemy may use under water or on land are explained to the class. Wooden obstacles, built to scale, are displayed so all hands can see them. The purpose of the obstacles and the location of them is discussed in detail.

After the lecture, the class takes a tour of the different beaches where the Sea Bees have built obstacles and placed them in defensive positions for training purposes. The design and strength of these man-made obstacles is taken from intelligence reports so that the practical work

in demolition which follows later in the course is directed against typical enemy defenses.

b. *Approaches.* The crews are taught to approach these obstacles from the seaward side with great caution. Jetted rails, scullies, or tetrahedrons can hospitalize a whole crew if the boat is not under control at all times. One complete day is spent in practicing approaches to different obstacles.

5. Explosives.

a. *Demolition Tools, Capping, and Priming.* These subjects are so important that it is considered necessary to test and re-test each man to make certain he has the basic skills and information. A lecture and demonstration are given before all trainees. Each team is then given special instruction until every member is thoroughly trained.

b. *Types of Explosives and Prepared Charges.* Lectures are given on each of the following explosives and prepared charges:

Primacord.
Booby trap devices.
Bangalore torpedoes.
Explosive hose.
Tetrytol.
Composition C, C2, and C3.
Shaped charges.
Mark 20 demolition charge.
TNT—½-lb. blocks:
Nitro-starch.
55-lb. charges.

Each explosive is taken up in a separate lecture. Characteristics, identification, explosive quality, application, priming with primacord, electric and non-electric caps, percussion detonators, Mark 3 firing devices, and safety precautions are all discussed.

c. *Practical Work on Explosives.* After the lectures on explosives are completed, trainees are divided into small groups and taken to various beach areas for practical work. This work is so organized that each individual trainee receives the same instruction and practice as all the others. All of the explosives treated in the lectures are used to demolish obstacles, which are exact reproductions of those found on enemy beaches and which include all types and sizes from the relatively small dragon's tooth to the nine foot, steel reinforced, concrete wall. This practical work qualifies trainees as experts in demolition and obstacle removal.

d. *Estimating Charges.* A series of lectures on estimating the amount of explosive to use on various structures and obstacles is given. These lectures cover the following:

(1) Formulae for breaching charges and distributing them on a plain or a reinforced concrete structure.

(2) Rule of thumb formulae for pressure charges, hasty demolition work, and steel cutting.

(3) Cratering charges and general sabotage work.

The practical work for this subject consists of a one-day tour of various structures in the Fort Pierce area. At each structure the trainees draw up a demolition plan, estimate the charges needed, make a survey of probable tactical situations and methods of placing charges under (a) ordinary conditions, and (b) combat conditions. Among the structures selected are: steel and concrete bridges, reinforced culverts, signal towers, dock installations, and a powerhouse.

e. *Review of Explosives.* In the general review of explosives, speeds of detonation, capping, and priming are again stressed. A lecture is also given on foreign explosives and how to identify them. Commercial explosives are also displayed and some practical work is given with 60 percent gelatine dynamite.

The remainder of the time is spent in perfecting methods of using hand-placed charges. Trainees at this time are given an opportunity to experiment with explosives, using any new ideas they might have.

As hand-placed charges are the most effective, it is considered highly important that trainees practice placing charges in this manner each day until they become so proficient that misfires are almost impossible.

6. Basic Reconnaissance.

This subject is given to all operating platoons in place of small boat training in order to conform with Naval Combat Demolition in the Central Pacific (Revised 14 September 1944).

Basic Reconnaissance includes the following subjects:

(a) Seamanship.

(b) Compass and Navigation.

(c) Chart Reading and Photographic Interpretation.

(d) Channel Marking.

(e) Night Vision and Coastal Silhouettes.

(f) Tides and Currents.

(g) Preparation for Jen-Stu-Fu Problem—the advanced course in reconnaissance and demolition.

7. Practical Reconnaissance.

Practical reconnaissance provides an opportunity to put to work all the basic material taught in the preceding course. All operating platoons are bivouacked at the St. Lucie section with their assigned boat crews. Team commanders are in charge of the problem.

A hydrographic and geographic reconnaissance is made of the area extending a mile and a half north of the jetty and three-fourths of a

mile south. A coral shelf and an inside reef varying in depth from 6 inches to 18 feet, run parallel to the shore line and provide an ideal area in which the teams can conduct their reconnaissance work.

Geographic and hydrographic charts of the reef are made by each team. Shallow water diving and surface reconnaissance, directed to the location of pinnacles or niggerheads, aid the engineer in making his charts.

Accurate data on currents, tides, surf, and soundings are made. Problems in night reconnaissance covering approaches to various sections of the beach are given to boat crews.

The coral area is very hazardous and surf and tide conditions are extremely dangerous to swimmers, divers, and boat handlers. In this type of situation, team commanders have an opportunity to observe their entire teams functioning as units. Weak spots in organization and training can readily be located. As the men are bivouaced in this area for an entire week, team commanders can give added instruction to any operating platoons or boat crews who are deficient in aspects of the work.

NOTE.—Experimental work is being done on coral blasting in the St. Lucie Inlet area using the report of Ensign R. G. Eiring, Unit #19 of the Pacific, "Blasting Coral," as a basis of estimating charges. It is felt by the staff at N. C. D. U. that a sense of estimating can come only by trial and error in blasting coral of various textures; then overloading can be figured through a "powder sense."

8. Standard Assault Problems.

A standard course provided in training is a beach made of fabricated obstacles that might be encountered in any theater of war.

The teams have four problems on the standard obstacle course. During these four problems, the following are stressed:

(a) Underwater reconnaissance.
(b) Approach to obstacles.
(c) Type of explosive best suited for each obstacle.
(d) Importance of communications between team units.
(e) Security and care of LCVP's and rubber boats.
(f) Discipline of crews on assignments.
(g) Working toward increasing speed in the placing of explosives.

During each problem, the instructors correct any errors being made. All failures and weak spots are kept on record by the beach judges. Perfection is the goal. When the crews are coordinated to the point that they appear to perform as one man—*speed*, *speed*, and more *speed* is stressed.

Each trainee officer must turn in a detailed report of every operation. No punches are pulled on general criticisms.

A critique is called after each problem and all the failures and

weak spots are again reviewed. The last standard assault problem is held at night to prepare the teams for the Pay-off Course.

9. Pay-off Assault Problem.

During the pay-off week, three, 300-foot obstacle courses are available for night assault problems. The courses consist of every type of obstacle, so placed in the water and on the beach as to impede any type of craft attempting to land.

The problem is given in the form of a battle plan and the trainee officers are given a briefing on the problem. All the preliminary work of organizing and securing of all gear is left to the team commanders.

Each team leaves the rendezvous area at a specified time, proceeds out to sea and awaits orders for the assault on a designated beach. The object of the assault is to clear a path 60 feet wide through obstacles that might impede the beaching of a landing craft, drawing 9 feet of water, at that specified area. During the operation the teams are harassed by heavy charges of explosives similar to those encountered in actual combat.

10. Jen-Stu-Fu Problem.

The Jen-Stu-Fu Problem is a continuation of the hydrographic and geographic work done at St. Lucie Inlet during Practical Reconnaissance. Different loading methods as practiced in the Pacific Area are used, such as "string loading," "checkerboard loading," "bull dozing," and "single head loading." Channel blasting and channel marking are experimented with by each team in various depths of water. Accurate reports must be submitted on each team's master reconnaissance plan, written reports on the amount of explosives used, and results for various coral formations are given. Each team functions as a unit and all personnel assigned to it are required to be working in the duties outlined in the Pacific manual. On page 59 a training team report on the Jen-Stu-Fu Problem will be found.

11. Advanced Training.

If teams remain longer than the 8-week period, training will be given to all hands in the use of small arms, .30- and .50-caliber machine guns, and 20-mm. guns at the Base range. All operating platoons will be given instructions in small boats by their headquarters' boat crews.

CURRICULUM FOR HEADQUARTERS PLATOON—ENLISTED PERSONNEL

Weekly Schedule and Hours Per Subject

Week	1st		2d	3d	4th	5th	6th	7th	8th
Rate	Indoctrination	Test in rate	Indoctrination in explosives	Rifle range	Practical work in rate	Problems with operating platoon	Standard assault problems	Pay-off assault problem	Coral problem
CBM	72	16	24	32	48	72	60	68	72
MoMM1c/2c	72	16	24	32	48	72	60	68	72
Cox/S1c	72	16	24	32	48	72	60	68	72
Deckhands	72	16	24	32	48	72	60	68	72
S1c (SM/RM)	72	16	24	8	48	72	60	68	72
CPhM/PhM1c	72	16	24	8	296	-----	-----	-----	-----
Y1c/2c	72	16	24	8	296	-----	-----	-----	-----
Cook	72	16	24	8	280	-----	-----	-----	-----
Baker	72	16	24	8	280	-----	-----	-----	-----
STM	72	16	24	8	280	-----	-----	-----	-----
RT1c/2c	72	16	24	32	48	72	60	68	72

DESCRIPTION OF COURSE FOR HEADQUARTERS PLATOON—ENLISTED PERSONNEL

Enlisted personnel of the headquarters platoon will be given a practical test in their respective rates when assigned to N. C. D. U. to determine whether they need further training before assignment to a U. D. T.

When assigned to a team, the men will be given a short course in the identification of explosives to familiarize them with ways of handling explosives and identifying the gear the operating platoons use.

The men from headquarters company assigned to operating platoons will be given a course at gunnery school in small arms (carbine and .45 caliber) and the .30 and .50 caliber machine guns.

The headquarters enlisted personnel will then be assigned to their operating platoons and will carry on their assignments as outlined in publication, Naval Combat Demolition in the Pacific (Revised 14 September 1944).

The cooks, bakers, and stewards mates will be assigned to the galley and each U. D. T. headquarters unit will have an opportunity to operate the galley, feeding about 180 officers and 800 enlisted men for one week. A report will be made by the mess officer as to their abilities.

The yeoman will be assigned to the various offices to acquaint him with handling confidential material, T. P. A., health records, etc. He will be assigned to U. D. T. headquarters at Camp and will make out all reports during the training period for his team.

The pharmacist's mates will be assigned to their U. D. T.'s and will accompany their teams on all operations. Special training will be available to pharmacists by the doctor assigned to the various problems.

Close order drill or physical training will be part of the daily schedule. The CBM will be responsible for appearance and military bearing of headquarters enlisted men.

Headquarters platoons will stand all regular inspections and guard duties assigned while in training.

Boat crews will be taught the use of shallow water minesweeping gear and the use of the "Woofus" 7.2 rocket from the LCM.

FIELD PROBLEMS IN RECONNAISSANCE AND CORAL BLASTING

1. The Jen-Stu-Fu Coral Problem.

There are two phases in the Jen-Stu-Fu Coral Problem—*reconnaissance* and *coral blasting*. All the training given at the Naval Combat Demolition Unit Project is reflected in the successful completion of this problem. It proves the resourcefulness of the officers and men and provides the Commanding Officer an excellent opportunity to observe the character and capabilities of the men under his command.

Their physical fitness is given a severe test, for the bivouac area is located on the sands immediately adjacent to the ocean. Vegetation consists of sand brush and mangrove swamps. It is insect-infested and without protection from the sun. The water in which they work is treacherous, with strong currents and swift tides. The men sleep in shelter halves and live on "C" rations for the entire week.

It likewise serves as a test as to how much the men have learned in their basic courses. The men who are attentive during the lectures and demonstrations invariably do the best work on this practical problem.

2. Organization of Teams.

HEADQUARTERS PLATOON

TEAMS A AND B

Commanding Officer	Lieutenant Commander.
Executive Officer	Lieutenant.
Mine Disposal Officer	Lieutenant (jg.).
Communication Officer	Lieutenant (jg.).
Boat Officer	Ensign.
Master-at-Arms	CBM.
Medical	PhM1c.
Administration	Y1c.
Coxswains	Cox.
Coxswains	Cox.
Coxswains	S1c.
Coxswains	S1c.
Engineers	MoMM1c.

Engineers	MoMM1c.
Engineers	MoMM2c.
Engineers	MoMM2c.
Radio Operator and Signal Men	SM1c.
Radio Operator and Signal Men	SM1c.
Radio Operator and Signal Men	SM1c.
Radio Operator and Signal Men	SM1c.
Radio Operator and Signal Men	SM1c.
Radio Operator and Signal Men	SM1c.
Radio Technician	RT1c.
Deck Hands	S1c.
Deck Hands	S2c.
Deck Hands	S2c.
Deck Hands	S2c.
Cook	SC1c.
Baker	Bkr2c.
Stewards Mate	StM2c.

5 Officers, 25 Men Each

OPERATING PLATOONS

No. 1, 2, 3, 4

Platoon Leader	Lieutenant (j.g.).
Assistant Platoon Leader	Ensign.
Reconnaissance	GM1c.
and/or	EM1c.
Demolition Work	CM2c.
Demolition Work	SF2c.
Demolition Work	S1c.

3. Assignment of the Problem for Reconnaissance.

File #10.

Serial #1.

Classification.

The Mission is. A reconnaissance shall be made on "Jen-Stu-Fu Inlet" by U. D. T.'s A and B from October 19th–26th.

The mission is to make reconnaissance on the approach to this area and land scouts if possible. If no opposition is met, land and carry out hydrographic reconnaissance in detail.

Transport Group. 1 LCM, 8 LCVP's, 16 LCR's.

Control Boat. LCPR.

Troops Involved. U. D. T.'s.

The Designation of the Commanders. Commanding Officers of Teams A and B.

Information. There is no available information of this enemy beach. Calculations will have to be made with precision. The approach to this area will depend upon the judgment of the Commanding Officers.

Stealth and concealment is vital as you will not have fire support. The information is of great tactical value and will be used later in a strategic move.

Special Instructions. Team commanders shall change details if conditions on shore endanger land operations.

Lieutenant _____
Operations Officer.

4. Orders for Reconnaissance.

NAVAL COMBAT DEMOLITAN UNIT,
AMPHIBIOUS TRAINING BASE,
Fort Pierce, Fla., ____ OCTOBER 1944.

From: Officer-in-Charge, N. C. D. U.
To: Commanding Officer, Team _____.
Subject: Practical Reconnaissance Problem at Jen-Stu-Fu, orders for.
Reference: (a) F. O. #1.
(b) Assignment of the Problem for Reconnaissance File #10—Serial # ____ October 1944.
Enclosure: (A) Copy of reference (b).

1. Jen-Stu-Fu is a Japanese area of strategic importance and the purpose of this operation is to sound, chart, and make reconnaissance of the area ½ mile North and ½ mile South of the jetty at this location. Soundings shall start ½ mile at sea and extend to the East shore of the inlet. Variable condition of the tide and time are to be taken into consideration when making soundings.

2. The operations shall be carried out by two (2) U. D. T.'s. Team A will reconnoiter Northerly half of area and Team B the Southerly half. Each Team shall submit data to headquarters to be compiled into a master chart of the entire area.

3. You are hereby directed to proceed to St. Lucie Inlet, leaving C. B. Dock, South Island, not later than 1100 _____.

4. Teams shall proceed South in Indian River to St. Lucie Inlet and out to sea to ½ mile point. Supplies shall be taken ashore in LCR's to the bivouac area, which shall be near and to the North of the jetty.

5. No Teams to secure from operations Jen-Stu-Fu until word is given by the operations officer.

6. The Team officers shall compile data into a master chart and turn it over to the Senior Instructor of Demolition.

7. Two (2) 511 radios with each team, when two or more teams are on operation. Operators shall be well acquainted with voice procedure.

8. With two or more teams on the same operation, a Battalion Headquarters shall be set up and reports to this command shall be made through this channel.

9. List of Supplies:

(1) Trench Shovels, 6.
(2) Battle Lanterns, 3.
(3) Flashlights, 6.
(4) Rake, 1.
(5) Shelter Halves, 100.
(6) Lister Bag, 1.
(7) Axes, 2.
(8) Tents, 2.
(9) Machetes, 2.
(10) Field Rations, 300 per day.
(11) Fly Spray, 2 gallons.
(12) Spray Guns, 6.
(13) Scat, 1 case.
(14) Toilet Paper, 24 rolls.
(15) Steel Wool, 3 rolls.
(16) G. I. Cans, 6.
(17) Milk Cans, 2.
(18) Carbines, 4.
(19) .45 Caliber Pistol, 1.
(20) Line; 200 feet Cotton, 200 feet 15-thread Sisal line or 1 inch line.
(21) Watch Belts, 2.
(22) Tent Posts for Shelter Halves, 100.
(23) Hammer, 1.
(24) Saw, 1.
(25) Nails, various sizes (3 pounds).
(26) Lumber, 12 2 x 4 or 2 x 3.
(27) Grappling Hook and Line, 4.
(28) Alphabet Flags, 6, A–B–C–D–E–F
(29) Numeral Flags, 4, 1–2–3–4.
(30) Field Glasses, 2.

10. Surveying Equipment and Supplies:

(1) Lead lines.
(2) Square beach markers, 2.

(3) Triangular beach markers, 2
(4) Yellow flags (supply hut), 4.
(5) Dead pelorus stands, 2.
(6) Chart table, 1.
(7) Intracoastal waterway chart No. 846 (USCS), 1.
(8) USCS Chart No. 1247, 1.
(9) Charting paper, pen and ink, rule, parallel.
(10) Magnetic compass, 1.
(11) Buoys (life jacket), 8.
(12) Buoys (conical balsa wood), 2.

11. Uniform. Fatigues, jungle boots, helmets, (liners), foul weather gear, life belts, swim trunks, blanket, mess gear, toilet articles. Each man shall look out for his own personal toilet articles.

12. Security. The Commanding Officer of each team shall be responsible for his Team's security and muster. There must be one full crew and officer aboard each LCVP at all times. One full crew and officer shall be on guard at each bivouac area at all times. Muster reports to be submitted each morning by 0900 to Staff representatives.

13. Sanitation. Each Team Commander shall be held responsible for the cleanliness and sanitary conditions of the camp.

(a) Slit trenches approximately one foot deep shall be dug on arrival at bivouac area. Trenches shall be dug at least 150 yards from the camp area. Trenches shall be covered and marked when Team is secured, noting latrine, Team, and date.

(b) One G. I. can of boiling sea water shall be provided by each Team at each meal time.

(c) The entire bivouac area must be policed at least once a day.

14. Chow. Field rations will be issued to the Team Commanding Officer and he will be held responsible for those rations and for seeing that the men are fed each meal time.

15. Critique. Officers shall report to the Officer-in-Charge of Naval Combat Demolition Unit at 1000, ____ October 1944, for interrogation. All data and charts shall be available at this time.

5. Preparing for Departure.

All equipment and supplies obtained, the Teams load the LCVP's and prepare to proceed to St. Lucie Inlet.

All manner of supplies are required for a six-day bivouac.

Staff Operations Officer shows boat officers the course to follow.

Officers and men are given a final briefing. From now on they are on their own.

6. Report of Reconnaisance.

File
Serial

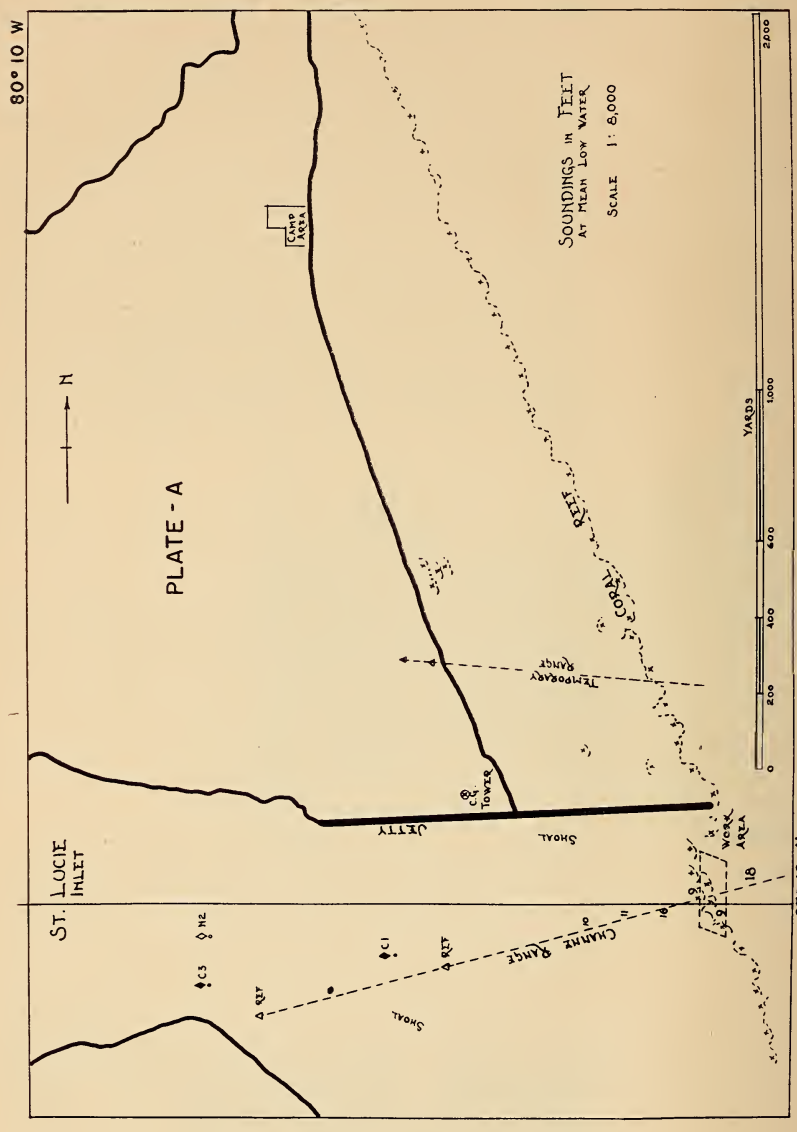
NAVAL COMBAT DEMOLITION UNIT,
AMPHIBIOUS TRAINING BASE,
Fort Pierce, Fla., ____ October 1944

From: Commanding Officer Battalion Nine.
To: Officer-in-Charge, N. C. D. U.
Subject: Practical Reconnaissance Problem at Jen-Stu-Fu; report of.
Reference: (a) F. O. #1.
(b) Practical Reconnaissance Problem at Jen-Stu-Fu, orders for. File ______, Serial ______, ____ October 1944, Assignment of the Problem for Reconnaissance.
Enclosures: (A) Chart of area (Plate A).
Report of beach reconnaissance dated ____ October 1944.

1. Pursuant to basic orders contained in Reference (a) and specific orders contained in reference (b), practical reconnaissance was carried out in area specified as Jen-Stu-Fu.

2. No enemy opposition was met. Enclosure (A) reflects the dangerous obstacles in the form of coral reefs blocking landings in this area. This reef at its southern extremity blocks the Inlet channel, making the use of the channel prohibitive to vessels drawing over five feet. No tank traps or land obstacles are present now. The terrain is flat and marshy and, except for one trail leading through a mangrove swamp, is practically impassable for personnel.

3. Enclosure (B), Report Form for Beach Reconnaissance, lists in detail, features and strategic data developed in this reconnaissance.


80° 10 W
27° 10 N
PLATE - A
N
ST. LUCIE INLET
JETTY
SHOAL
CAMP AREA
TEMPORARY RANGE
CORAL REEF
SOUNDINGS IN FEET
AT MEAN LOW WATER
SCALE 1: 8,000
YARDS
0
200
400
600
1000
2000
WORK AREA
118
CHANNEL RANGE
REF
C1
C3
H2

REPORT FORM FOR BEACH RECONNAISSANCE

Date ____ October 1944.

Location of Beach *Jen-Stu-Fu (east beach)*

Length of Beach (in yards) *2,100* Width of Beach (in yards) *35*

Length of Portions of Beach Suitable for Landing *2,100 yards*

Length of Portions of Beach not Suitable for Landing *None*

Vertical Differences Between High and Low Tide (in feet) *3.6*

Recession of Water Line Between High and Low Tide (in yards) *25*

Location of 3-foot Depth Line at Low Tide *9 yards offshore*

Character of Bottom from 3-foot Depth Line *Sandy bottom except for coral rocks awash 600 yards North of jetty.*

(Can it be Negotiated by Infantrymen and Wheeled Vehicles) *Yes*

Location of Sand Bars and Reefs on Approaches to Beach with Depths of Water Over Each at High and Low Tide *Long reef shown on Plate A extends diagonally across approaches to beach from jetty to shore. Depth of water over reef at high tide 4 to 5 feet. Depth of water over reef at low tide 1 to 2 feet.*

Sorties from Beach (Roads and Trails) with Nature of Each (width, grade and surface) *Jungle paths not permanent. Not shown on Plate A.*

Known Defensive Positions, Extent and Nature *No land positions. Small patrol vessel equipped with .30 caliber and .50 caliber machine guns anchors inside inlet West of can buoy 3.*

Obstacles in Water or on Beach, Extent and Nature *Coral reef touches shore line 2,100 yards North of jetty and extends 150° true to end of jetty, thence Southward 400 yards across inlet entrance. Reef at shoreline approximately 8 to 10 feet in width, pinnacle-type broadening gradually to 30 feet in width at inlet entrance with coral heads 2 to 3 feet high formed on a wide base of hard coral rock 30 feet wide. No other obstacles present now.*

Mines in Water or on Beach, Type, Extent and Location *None*

Nature of Vegetation on Beach, Type, Extent and Location *Sand-spurs, small brush near beach. Large bushes and mangrove swamp inland.*

Average Height of Waves (Different Seasons of Year) *Summer 2–3 feet. Fall 5–6 feet.*

Do Small Boats Land on this Beach *No*

Remarks *(Insects (mosquitoes and sand flies) make life unpleasant during summer and fall months.)*

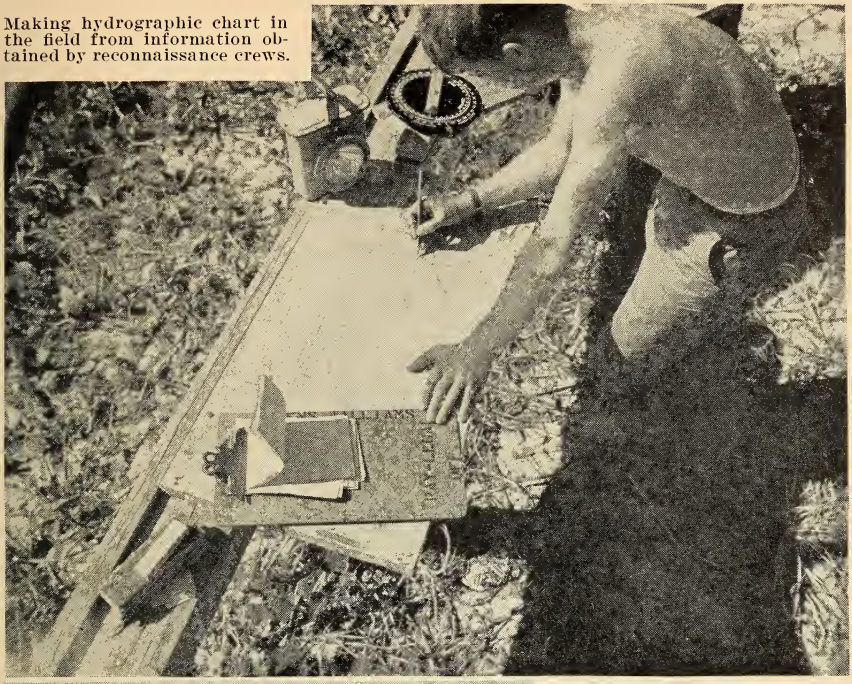
CORAL BLASTING—SCENES TAKEN DURING THE JEN STU FU

General view of the bivouac area.

Typical coral formation as found at St. Lucie Inlet.

CORAL PROBLEM AT ST. LUCIE INLET

Making hydrographic chart in the field from information obtained by reconnaissance crews.



"C" Rations are the menu of the day every day while working on the Jen-Stu-Fu Coral Problem.

1. Assignment of the Problem for Demolition.

File #10
Serial #1A
Classification

The Task is: Hydrographic plans show that a channel through a coral reef blocking the inlet entrance is necessary in order to land heavy equipment on the mainland of Jen-Stu-Fu.

The operation involves blasting a large coral formation located at the seaward end of the St. Lucie Inlet shown as "working area" on plate A. This channel to be nine feet in depth at mean low water with a minimum width of 24 feet — preferably 50 feet.

Commanding officers shall alternate firing periods—Team A taking firing periods number one and three—Team B taking firing periods number two and four. The Team not handling firing will maintain security in order that no friendly units will be destroyed during operations.

Transport Group. 8 LCVP's.

Explosive Boat. 1 LCM—(5 tons of explosive).

Troops involved. 2 U. D. T.'s.

Information. Report of practical reconnaissance problem at Jen-Stu-Fu, File_____, Serial_____, ____October 1944

Designation of Commanders. Commanding Officers of Teams A and B shall control the operation.

General Specifications of "D" Day and "H" Hour:

1. D-Day shall be ____ October 1944.

2. H-Hour shall be designated by Commanding Officers depending on weather and surf conditions.

Lieutenant _____

Operations Office.

2. Orders for Demolition.

NAVAL COMBAT DEMOLITION UNIT,
AMPHIBIOUS TRAINING BASE,
Fort Pierce, Fla., ___ October 1944.

Classification

From: Officer-in-Charge, N.C.D.U.
To: Commanding Officer, Team _____.
Subject: Demolition Problem at Jen-Stu-Fu; Orders for.
Reference: (a) F. O. #1.
(b) Assignment of the Problem for Demolition, File #10, Serial #1A, ____ October 1944.
(c) Report of Reconnaissance of Battalion Nine Headquarters Jen-Stu-Fu—File _____, Serial _____, ____ October 1944.

Enclosure: (A) Copy of Reference (b).

1. Jen-Stu-Fu is a Japanese area of strategic importance and has been designated in reference (a) as the next objective of our forces. The purpose of this operation for Demolition is to open the channel entrance at Jen-Stu-Fu Inlet (St. Lucie Inlet) for vessels of nine (9) foot draft or less. The present depth over the reef blocking the entrance is five (5) feet.

2. The operations shall be carried out by two (2) U. D. T.'s, Team A and Team B. Teams shall take firing periods as outlined in reference (b). Both teams shall compile all data for Battalion Headquarters to be forwarded to the Commanding Officer of Naval Combat Demolition Unit.

3. You are hereby directed to proceed to St. Lucie Inlet (Jen-Stu-Fu Inlet) leaving C. B. Dock, South Island, not later than 1100____.

4. Teams shall proceed South in Indian River to St. Lucie Inlet and out to sea to ½ mile point. Supplies shall be taken ashore in LCR's to the bivouac area, which shall be near and to the North of the jetty.

5. No Teams to secure from operations Jen-Stu-Fu until word is given by the operations officer.

6. The Team officers shall compile data into a master chart and turn it over to the Senior Instructor of Demolition.

7. Two (2) 511 radios with each team, when two or more teams are on operation. Operators shall be well acquainted with voice procedure.

8. With two or more Teams on the same operation a Battalion Headquarters shall be set up and reports to this command shall be made through this channel.

9. List of Supplies:

(1) Trench Shovels, 6.
(2) Battle Lanterns, 3.
(3) Flashlights, 6.
(4) Rake, 1.
(5) Shelter Halves, 100.
(6) Lister Bag, 1.
(7) Axes, 2.
(8) Tents, 2.
(9) Machettes, 2.
(10) Field Rations, 300 per day.
(11) Fly Spray, 2 gallons.
(12) Spray Guns, 6.
(13) Scat, 1 case.

9. List of Supplies—Continued.
   (14) Toilet Paper, 24 rolls.
   (15) Steel Wool, 3 rolls.
   (16) G. I. Cans, 6.
   (17) Milk Cans, 2.
   (18) Carbines, 4.
   (19) .45 Caliber Pistol, 1.
   (20) Line; 200 feet Cotton, 200 feet 15-thread Sisal line or 1 inch line.
   (21) Watch Belts, 2.
   (22) Tent Posts for Shelter Halves, 100.
   (23) Hammer, 1.
   (24) Saw, 1.
   (25) Nails, various sizes (3 pounds).
   (26) Lumber, 12, 2 x 4 or 2 x 3.
   (27) Grapling Hook and Line, 4.
   (28) Alphabet Flags, 6, A–B–C–D–E–F.
   (29) Numeral Flags, 4, 1–2–3–4.
   (30) Field Glasses, 2.

10. Surveying Equipment and Supplies:
   (1) Lead lines.
   (2) Square beach markers, 2.
   (3) Triangular beach markers, 2.
   (4) Yellow flags (supply hut), 4.
   (5) Dead pelorus stands, 2.
   (6) Chart table, 1.
   (7) Intracoastal waterway chart No. 846 (USCS), 1.
   (8) USCS Chart No. 1247, 1.
   (9) Charting paper, pen and ink, rule, parallel.
   (10) Magnetic compass, 1.
   (11) Buoys (life jacket), 8.
   (12) Buoys (conical balsa wood), 2.

11. List of Explosives Used:
   (1) Lengths explosive rubber hose, 48.
   (2) 50# TNT charges, 10.
   (3) Rolls 1000′ each primacord, 2.
   (4) Rolls 50′ each safety fuze, 2.
   (5) #8 Engineers special blasting caps, electric, 50.
   (6) #8 Engineers special blasting caps, non-electric, 20.

12. Blasting Equipment:
   (1) Navy reels, 2.
   (2) Army reels, 2.
   (3) Galvanometers, 2.

(4) Blasting machines (10 cap) test, 2.
(5) Pr. Crimpers, 2.
(6) Rolls friction tape, 3.

13. Uniform. Fatigues, jungle, boots, helmets, (liners), foul weather gear, life belts, swim trunks, blanket, mess gear, toilet articles. Each man shall look out for his own personal toilet articles.

14. Security. The Commanding Officer of each team shall be responsible for his Team's security and muster. There must be one full crew and officer aboard each LCVP at all times. One full crew and officer shall be on guard at each bivouac area at all times. Muster reports to be submitted each morning by 0900 to Staff representatives.

15. Sanitation. 1. Each Team Commander shall be held responsible for the cleanliness and sanitary conditions of camp.

(a) Slit trenches approximately one foot deep shall be dug on arrival at bivouac area. Trenches shall be dug at least 150 yards from the camp area. Trenches shall be covered and marked when Team is secured, noting latrine, Team and date.

(b) One G. I. can of boiling sea water shall be provided by each Team at each meal time.

(c) The entire bivouac area must be policed at least once a day.

16. Chow. Field Rations will be issued to the Team Commanding Officer and he will be held responsible for those rations and for seeing that the men are fed each meal time.

17. Critique. Officers shall report to the Officer-in-Charge of Naval Combat Demolition Unit at 1000, ____ October 1944, for interrogation. All data and charts shall be available at this time.

3. Report of Demolition.

NAVAL COMBAT DEMOLITION UNIT,
AMPHIBIOUS TRAINING BASE,
Fort Pierce, Fla., ___ October 1944.

From: Commanding Officer Battalion Nine.
To: Officer-in-Charge, N. C. D. U.
Subject: Demolition Problem at Jen-Stu-Fu; Report of.
Reference: (a) F. O. #1.
(b) Demolition Problem at Jen-Stu-Fu; Orders for, File _____, Serial _____, ____ October 1944.
(c) Reconnaissance Problem at Jen-Stu-Fu; Report of, File _____, Serial _____, ____ October 1944.
Enclosures: (A) Chart of Area (Plate A).
(B) Plates 1 through 6—reef profiles and plans.
(C) Demolition report forms—charges 1 through 4.

1. Pursuant to basic orders contained in reference (a) and specific orders contained in reference (b), demolition was carried out on the reef which blocked the channel entrance at Jen-Stu-Fu (St. Lucie Inlet) according to reference (c).

2. The chart of area (enclosure (A)), shows detail only at working area as assault reconnaissance at D-Day and H-Hour would permit no further soundings and charting. Enclosure (B) Plate B–1 shows plan view as sketched by divers before blasting began. Enclosure (B) Plate B–2 shows placing of charge #1. Enclosure (B) Plate B–3 shows results of charge #1 and placing of charge #2. Enclosure (B) Plate B–4 shows results of charge #2 and placing of charge #3. Enclosure (B) Plate B–5 shows results of charge #3 and placing the last charge, #4. Enclosure (B) Plate B–6 shows final results, profile view of reef. Enclosure (B) Plate B–7 shows plan view of reef looking Eastward.

3. Demolition report forms (Enclosure (C)) contain detailed information regarding placement of charges and results.

4. The range shown in Enclosure (A) was the center line of operations. Soundings on the range after operations revealed nine (9) feet of water at mean low water. The channel width approximately 30 feet.

Battalion Commander.

4. Four Reports on Demolition Results.

DEMOLITION REPORT FORM

Charge Number	*Date*	*Time*	*Obstacle*	*Tide*	*Current*	*Total Weight Explosives*	*Detonation*
1	23 Oct. 1944	1300	Coral heads	Flood Slack	In Minimum flow 2 knots	450#	#8 Engineers special electric cap

Charge.

Nine lengths rubber hose made into three units of 3 lengths each. Each unit was primed with Primacord on one length of the three.

Placing Procedure.

Inspection of the coral bottom by divers revealed coral heads of one to two feet in height and two to three feet in diameter spaced irregularly along a North-South line, as shown in Enclosure (B–1). Depth of water was from six to eight feet. The three units of 3 lengths each were lowered from the LCVP's (2 LCVP's anchored 30 feet apart) by ¾ inch line and guided into place by the divers. The three units were criss-crossed between the coral heads in the manner shown in Enclosure (B–1).

Results.

Large broken coral heads (2½ x 2½ x 2¼) on the bottom. No apparent increase in water depth. Divers standing on the pieces could stick their heads out of water.

Remarks.

Demolition of coral heads not complete.

DEMOLITION REPORT FORM

Charge Number	*Date*	*Time*	*Obstacle*	*Tide*	*Current*	*Total Weight Explosives*	*Detonation*
2	23 Oct. 1944	1730	Coral	Ebb	Out Maximum flow 6–7 knots	600#	#8 Engineers special electric

Charge.

Twelve lengths rubber hose each primed with Primacord.

Placing Procedure.

To further break up the large broken pieces of coral caused by the first charge, the 12 sections of rubber hose were suspended parallel to each other and three feet apart on a one (1) inch line which was drawn taut between the two LCVP's anchored 40 feet apart. Due to the swift current encountered at this time, divers made only a preliminary dive locating the broken coral heads. As the rubber hose rig was lowered into the water, the current pulled the unattached ends into a plane parallel with the ocean floor. Crews handling the one inch line lowered away together and the 12 sections sank into place. See Enclosure (B–1).

Results.

Demolition of broken coral heads. All debris carried out to sea by swift outgoing current.

Remarks.

Coral heads removed.

DEMOLITION REPORT FORM

Charge Number	*Date*	*Time*	*Obstacle*	*Tide*	*Current*	*Total Weight Explosives*	*Detonation*
3	24 Oct. 1944	0930	Coral	Ebb Slack	Out Minimum flow 1 knot	1300#	#8 Engineers special non-electric

Charge.

Four lengths of rubber hose, 10–50# Apex TNT charges, 12 lengths rubber hose (made into mat). Four lengths of rubber hose

were made into one unit by joining them with the threaded male and female ends. This unit was primed at each end with Primacord. 10–50# charges were each primed with 16 turns of Primacord and tied into the rubber hose at approximately 8 foot intervals. Primacord leads from each 50# charge were wound around the rubber hose six times. The mat (25′ x 25′) made of 12 lengths rubber hose, was primed in four places with Primacord at each corner on four different lengths of rubber hose.

Placing Procedure.

With the bottom clean of loose coral, only the hard coral rock, the color of limestone, remained in this area. The 4 sections of rubber hose and 10–50# TNT charges were placed in the form of a U to cover the limestone-appearing area. The mat of 12 lengths of rubber hose was placed over the reef slightly to the North of the 4 rubber hose and 10–50# TNT charges. (Enclosure B–1.) A Primacord trunk line connected all 50# TNT charges and the two primed ends of the 4 lengths rubber hose unit. Another Primacord trunk line joined the four primed ends of rubber hose in the mat. Both trunk lines were joined and double-capped.

Results.

Definite cratering effect, taking out section of coral previously blocking channel. Water depth increased to nine feet at mean low water. Width of crater approximately 25 to 30 feet.

Remarks.

This charge proved to be the most successful insofar as clearing the hard coral base rock. Due to the width of reef at this point (30 feet), more explosives were used than was at first considered necessary. Preliminary charges would be necessary to remove coral heads in a similar case due to their effect in keeping the main explosive away from the hard coral base rock.

DEMOLITION REPORT FORM

Charge Number	*Date*	*Time*	*Obstacle*	*Tide*	*Current*	*Total Weight Explosives*	*Detonation*
4	24 Oct. 1944	1257	Coral	Flood	In Mean flow 4 knots	600#	#8 Engineers special non-electric

Charge.

Twelve lengths rubber hose made into two units of 6 lengths each. Each unit primed with Primacord on one length of the six.

Placing Procedure.

To widen the channel obtained from the previous charge, the two units of 6 lengths rubber hose were placed over the North side of the channel in 7 feet of water. The point of placement was first located by a sounding crew working from an LCR. This point was marked by a buoy. The LCVP placing the charge then crossed the area and made a "flying placement" without anchoring.

Results.

The north side of the channel in this area was broken down one to two feet for a very small area.

Remarks.

This small charge lying close to the hard coral rock was able to clear considerable area, completing the operation.

5. Results of Blast.

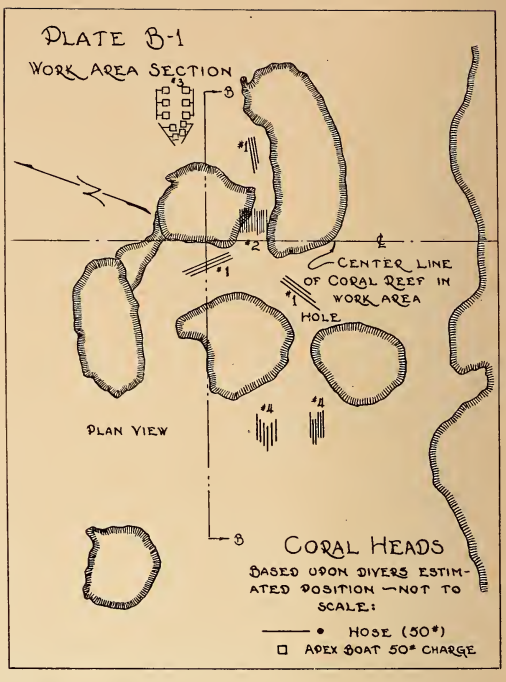


Plate B–1
Plan view as sketched by divers before blasting.

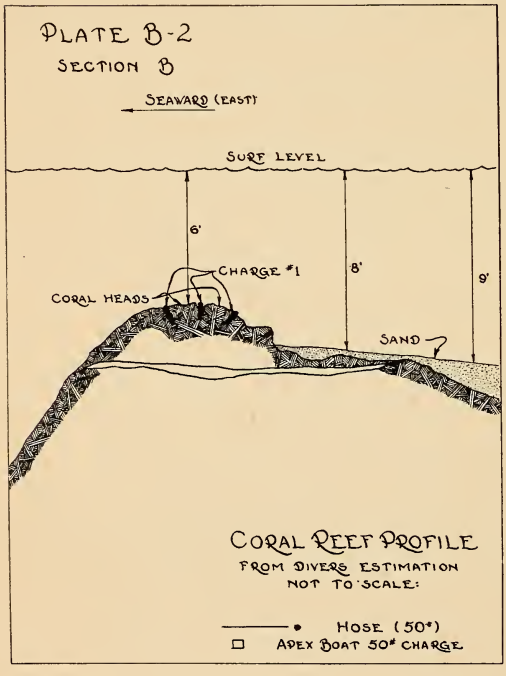


Plate B–2
Placing of charge #1. Nine lengths of rubber hose made into three units. Each unit was primed by Primacord on one length of the three.

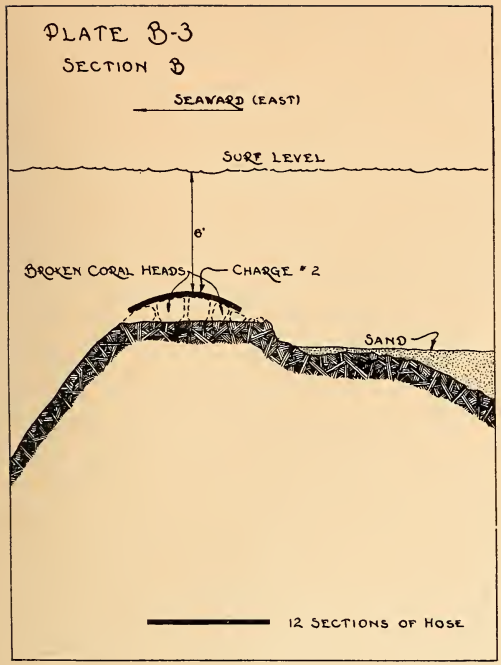


Plate B–3

Shows results of charge #1 and the manner of placing charge #2. Twelve lengths of rubber hose each primed with Primacord.

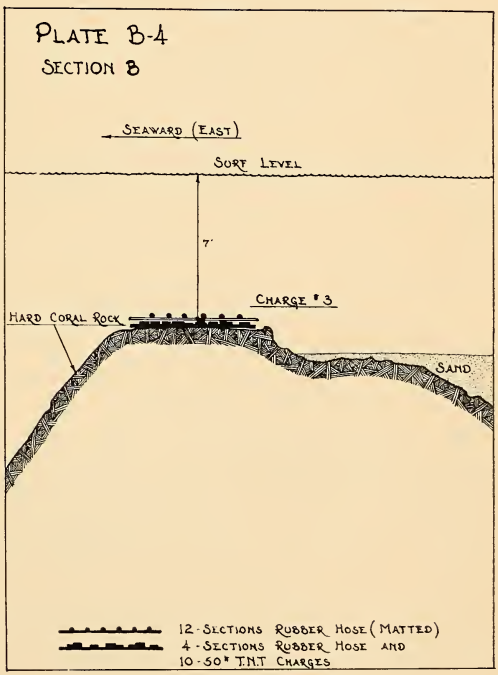


Plate B–4

Shows results of charge #2 and manner of placing charge #3. One mat of 12 lengths, ten 50 lb. charges tied in by Primacord to four lengths of rubber hose and placed on hard coral bed.

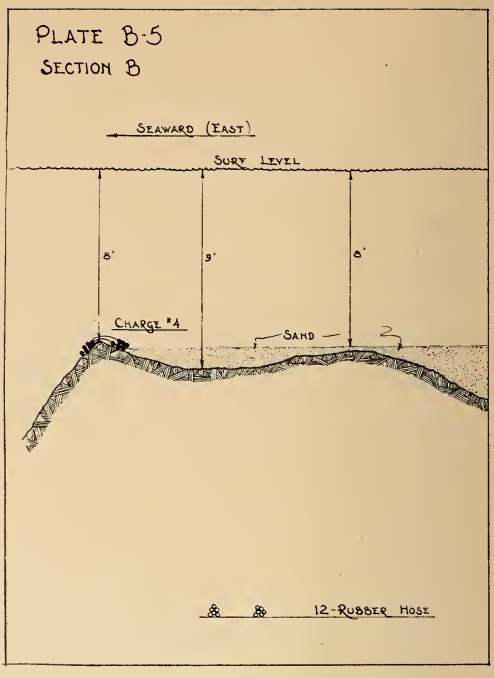


Plate B–5

Results of charge #3 and the placing of the final charge.

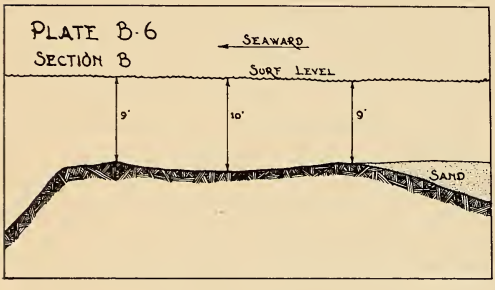


Plate B–6

Final results—profile view of reef.

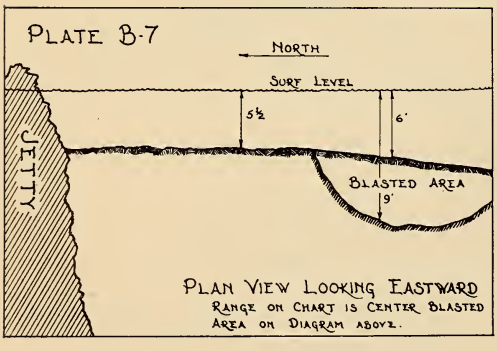


Plate B–7

Plan view of reef looking Eastward.

APPENDIX A. THE MARK 20 DEMOLITION CHARGE

The Mk. 20 charge was developed by Lt. Hagensen, Naval Combat Demolition Unit staff member, with the cooperation of Naval Demolition Units, while on duty with the Eleventh Amphibious Force in the United Kingdom.

In March 1944, underwater obstacles began to appear in large numbers on the contemplated invasion beaches on the French Coast, and grew in density as D-Day approached. It soon became evident that due to the elaborate fortifications immediately in the rear of these obstacles, that any plan other than a combined assault by infantry on the fortifications, and by demolition teams on the obstacles, would be certain to meet with failure. It was also obvious that blast and shrapnel effect must be kept to an absolute minimum due to the congestion of troops on the assault beaches.

The primary aim was to devolop a small charge which could be quickly secured and which would be adapted to almost any underwater obstacle encountered. Also a charge was desired which would cut the critical members of any obstacle and let it fall flat rather than be completely disintegrated by demolitions. In the charge finally developed, for example, 26 pounds of explosive Mk. 20 is substituted for the 308 pounds originally used in the demolition of element C.

Composition C–2 was chosen as the explosive for the Mk. 20, due to its quality of conforming to the contour of the members of nearly all gravity obstacles. Primacord with a five-foot lead which could be quickly secured to a main trunk line was used for a primer. A canvas container was used, with a hook and sash cord for securing.

The Mk. 20 was used on beaches where American landings were made in Normandy, by both the Naval Demolition Units and the Army Engineers.

After the Normandy invasion, the specifications for the Mk. 20 were turned over to BuOrd and several hundred charges were made and sent to Fort Pierce for testing and approval by the Joint Army-Navy Testing Board. The Board approved the charge for use by all Demolition Teams and also recommended that it be incorporated into training programs by Demolition schools. In addition, the Board recommended that it be packaged in an ammunition-carrying bag containing 20 of the Mk. 20 charges, thereby making the charge more adaptable to concrete obstacles, inasmuch as the 20 charges, totaling 40 pounds in weight, can be detonated simultaneously if required.

As the individual Mk. 20 charge contains only two pounds of explosive, a great deal of training in proper placement and in estimating the right amount of explosive is necessary. Also, as it is designed for speed, several dry runs on selected beaches are necessary.

APPENDIX B

Equipment Required for Training and Combat Operations of Underwater Demolition Teams

1. Tetratol (Chain Demolition Charges in Haversacks), Tons.
2. T. N. T. in ½ or 1 lb. Blocks, Tons.
3. Bangalore, Torpedoes, Cases.
4. Dummy Bangalores, Cases.
5. Composition C–2, Tons.
6. Composition C, Tons.
7. Primacord, Feet.
8. M–2 Waterproof Fuze Lighters.
9. Tetryl Caps, Non-Electric.
10. Tetryl Caps, #8, Electric (no delay).
11. Dummy Electric Caps.
12. Blasting Caps, #8, Assorted Delay.
13. Safety Fuze, Waterproof, Feet.
14. Explosive Hose, Mk. 8, 25 ft. Lengths.
15. Tirex 16–2 Double Conductor Lead Wire, Feet.
16. Reels, 1,000 Feet Stirrup Type.
17. Reels, 1,000 feet Lead Wire with Stands, Mk. 2 without Exploder and Ohmmeter.
18. Ten-Cap Exploders (Hell-Boxes).
19. Galvanometers.
20. Cap Crimpers, Pairs.
21. Pistols, .38 Cal.
22. Cartridges for .38 Cal. Pistols, Cases.
23. Carbines, .30 Caliber.
24. Cartridges for .30 Caliber Carbine, Cases.
25. Magazines for .30 Caliber Carbines.
26. Pouches for Carbine Magazines.
27. Gun Covers.
28. Hand Signal Projector with 12 Cartridges, (Abandon Ship Kit).
29. Pistol Belts, Web.
30. Canteens.
31. Canteen Covers.
32. Sheath Knives.
33. Helmets, Steel.
34. Helmet Liners.
35. Gas Masks, Mk. 3.
36. Ponchos.
37. First Aid Packets.
38. First Aid Pouches.
39. Lifebelts.
40. CO_2 Cartridges for Lifebelts.
41. Sea Bags.
42. Green Twill Jackets.
43. Green Twill Trousers.
44. Green Shirts.
45. Foul Weather Parkas.
46. Foul Weather Trousers.
47. Gloves, Canvas, Leather Palms, Pairs.
48. Marine Field Shoes, Pairs.
49. Swimming Shoes, Pairs.
50. Tennis Shoes, Canvas, Rubber Soles, High Tops, Pairs.
51. Swimming Trunks, Gabardine, Tan, Pairs.
52. Swim Fins, Pairs.
53. Seadive Face Masks, with Live-Foam Rubber Lining.
54. Shallow Water Diving Gear, Sets.
55. Outboard Motors, 9 to 12 Horsepower.

56. LCR(S)'s (7-Man Rubber Boats with Paddles).
57. Watches, Waterproof, Wrist with Luminous Dials.
58. Compasses, Waterproof, Wrist, with Luminous Dials.
59. Binoculars, 7 x 50 Pairs.
60. Cameras, Kodak "Medalists."
61. Film for Item 60, plus Rolls.
62. Balloons, Rubber, 20", Aerological type.
63. Penlights (Fountain Pen Type Flashlights, Complete with Bulbs and Batteries) 17–F–13475.
64. Batteries for Item 63.
65. Bulbs for Item 63.
66. Flashlights, Waterproof.
67. Batteries for Item 66.
68. Bulbs for Item 66.
69. Blinker Signal Lights, Multi-Purpose, Sets.
70. Batteries for Item 69.
71. Bulbs for Item 69.
72. SCR–610 Radio Sets, Complete with Tubes and Batteries.
73. Batteries, BA–39.
74. Batteries, BA–40.
75. Batteries, BA–41.
76. SCR–610 Radio Repair Kit, Me–13–C.
77. SCR–536 Radio Sets, Complete with Tubes and Batteries.
78. Batteries, BA–37.
79. Batteries, BA–38.
80. Prophylactics, Waterproof, Gross.
81. Cap Sealing Compound, Cans.
82. Oxygen Cylinders (Large Bottles).
83. Pressure Reducing Valves.
84. Gasoline Cans, 5-Gallon.
85. Funnels for Item 84.
86. Distilled Water, 5-Gal. Carboys.
87. Lubricating Oil, Pints.
88. Mechanics' Tool Kits.
89. Carpenters' Tool Kits.
90. Pliers, Side-Cutting, 10-inch, Pairs.
91. Wire Cutters, 10-inch.
92. Field Desks.
93. Semaphore Flags, Sets.
94. Pennants, Red.
95. Pennants, Black.
96. Pennants, Red and Black.
97. Pennants, Yellow.
98. Floats, Balsa Wood.
99. Floats, Conical, Metal (Channel Marker Buoys).
100. Grapnels, 4 lb.
101. Grapnels, 15 lb.
102. Lead Weights, 7 lb.
103. Cotton Line, ½", Feet.
104. Marline, Feet.
105. Manila Rope, 6-Thread, Coils.
106. Manila Rope, 21-Thread, Coils.
107. Manila Rope, 3¼", Coils.
108. Friction Tape, ¾", Rolls.
109. Jungle Flotation Blanders.
110. Plexiglass (3" x 10" Sections), Square Feet.
111. Fishline, Feet.
112. Wire Rope, ½" Plow, Feet.
113. Sailmakers' Palms and Needles.
114. Pelican Hooks.
115. Bailing Wire, #14 or #16, Feet.
116. Cable Clamps, ½".
117. Burlap Bags.

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U. S. War Department Field Manual, FM5–30.
U. S. War Department Field Manual, FM5–31.
U. S. War Department Field Manual, FM5–35.
U. S. War Department Technical Manual, TM3–300.
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TRAINING AIDS

The following training films are used by the project.

Catalog Film No.	Title	Time in minutes
MN–202r	Rules of the Nautical Road—Crossing Steam Vessels	15
MC–1443	Gray Marine Diesel Goes to War	45
MA–2670	Zombie—7″ Rocket	30
MN–3584	Chemical Warfare, Navy Gas Mask Drill	14
MA–4217	Battle for New Britain	50
MA–1038a	Explosions and Demolitions, TNT Part I	10
MA–1038b	Explosions and Demolitions, TNT Part II	10
MA–1038c	Explosions and Demolitions, Electric Blasting Equipment, Part III.	12
MA–1038f	Explosions and Demolitions, Girders and Bridges, Part V.	11
MA–1038g	Explosions and Demolitions, Cratering, Part VII	11
MA–1038h	Explosions and Demolitions, Dynamite, Part VIII	12
MA–1423	Anti-Personnel Obstacles, Detection of Booby Traps	21
SA–1423c	Booby Traps, Mines, Part VI	(Strip)

Handbook of naval combat underwater demolition team training.